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THE STUDY ON DIVERSITY OF GASTROPOD FAMILY TURBINIDAE PRESENT ALONG VERAVAL COAST, GUJARAT

Mamata M. Barad* and A.J. Bhatt*
*Department of Fisheries Resource Management
College of Fisheries Science, Junagadh Agricultural University
Veraval-362 265, Gujarat, India

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ABSTRACT

Present investigation has been conducted on Veraval coast (20°54'39" N 70°21'3"E) (vertical) 20°54'38"N 70°21'4" (horizontal). The study was conducted at Veraval coast intertidal zone to evaluate the present status of the Turbinidae familygastropod species during June 2017-March 2018. Result showed that from Family (Turbinidae), different species were recorded like Lunella coronata, Australium stellare, Turbo bruneus(green), Turbo bruneus (brown), Astralium Semicosatum. Seasonal variation of family Turbinidae were recorded maximum during the post-monsoon season (September-December). Among the all species Lunella coronata was the most dominance speciesand second dominance species was Turbo bruneus. All species were found throughout the study period in all zone of intertidal area. So study concluded that the selected coast was rich in the family Turbinidae.

Keywords : Gastropod, turbinidae, intertidal zone, veraval.

INTRODUCTION

In the phylum mollusca, gastropods are a large and highly diversified class. There are two types of gastropods: some possess a shell and some are without the shells. Those gastropods possess the shell that known as univalves. There are also different types of gastropods some are terrestrials and some gastropods live in marine as freshwater habitat. From that near about 85,000-1,00,000 species found as mollusks. Strong et al.(2008) found throughout the world from the garden to deep-water hydrothermal vent colonies. Current estimations show that from total number of the molluscans, about 2,40,000 species are undescribed species (Appeltans et al., 2011).

Some Gastropod species are used as the biological indicator and assess the water quality. Condition of the any aquatic habitat depend on the presence of the certain gastropods species. Some gastropods species serves as the food for fishes, birds and human beings. Brown(1994) stated that some gastropods provide their role as intermediate host of harmful trematodes and other parasites of animals and human beings, and they need to be scientifically explored and studied for they play significant roles in public and veterinary health.

Meat of molluscans is very healthy and nutritious for the animals, it content good amount of essential amino acid, proteins, rich vitamins and minerals (Thanonkaew et al., 2006). Giese (1969) reported that among all the nutrition, protein is major constituent and high amount in the molluscans. Gastropods proven as the boon for the millions of malnourished people due to their biochemical composition. Gastropods meat is very beneficial for the heart diseases people because it's meat is free of cholesterol. Today in many countries Gastropods meats serves in the restaurants with other seafood items such as a good sources of nutrition and prepare variety of delicious recipes like such as stews, soups, salads, appetizersand hotpot, curry and cutlet (exam. Fusinus nicobaricus). Consumer preference is increase day by day so, in future it will become regular food items in daily diet. Marine mulluscans used in different ways in our lives such as foods, craft making, yard and clothes etc. So it is also used as the source of income generation and special attention for the future purpose (Garza et al., 2012).

MATERIALS AND METHODS

As we all known, Gujarat situated on the western coast of the India. Study area has been also human interaction. Site was selected at (20°54'39" N 70°21'3"E) (vertical) 20°54'38"N 70°21'4" (horizontal), behind the light house (Fig. 1).

Data collection

The intertidal zone of the sampling site was surveyed regularly from June 2017 to March 2018 on monthly basis and all the gastropod species from family Turbinidae (Gastropod) encountered or recorded during the low tide and latter classified on the basis of family by using WoRMS (2018) site and Apte (2012). A belt transect method was used for sampling and 1 m2 quadrate was placed at sampling point. And all the species of Gastropods present within the quadrant were collected, identified and number of individuals were recorded as per family wise for density. Different species from this family were distributed in all three zones.

Fig.-1. Map showing the study location i.e. the Veraval Coast, Gujarat (Source: Google Map).

RESULTS AND DISCUSSION

There were five species of family Turbinidae were reported along the Veraval coast those were Lunella coronata, Australium stellare, Turbo bruneus(green), Turbo bruneus (brown), and Astralium Semicosatum (Table.1 & Fig. 2). The seasonal variation shows that during the post-monsoon (September-December) season diversity and density of the Lunella coronate was found highest, after that second position wasTurbo bruneus (brown). While other three species of family Turbinidae, viz., Turbo bruneus (green), Astralium stellar andAstralium semicostatumwere recorded in small amount (Fig. 3).

During the study period (June 2017-March 2018) all the species of family Turbinidae recorded in all zone of the intertidal area. Due to the favorable environmental condition and higher arability of the food (algae) is sport the good growth of family Turbinidae throughout the year.

Table-1. List of species present from Family Turbinidae during study period June 2017-March 2018.

Phylum	Class	Family	Species
Mollusca	Gastropoda	Turbinidae	*Lunella coronata*
			Turbo bruneus (g)
			Astralium Semico Satum
			Turbo bruneus (b)
			Australium stellare

Fig.-2. (1 a & b) Lunella Coronata(dorsal and Ventral); (2 a & b) Turbo bruneus(dorsal and Ventral), (3 a & b) Astralium stellar(dorsal and Ventral);(4 a & b)Turbo bruneus(dorsal and Ventral);(5 a& b)Astralium semicostatum (dorsal and Ventral).

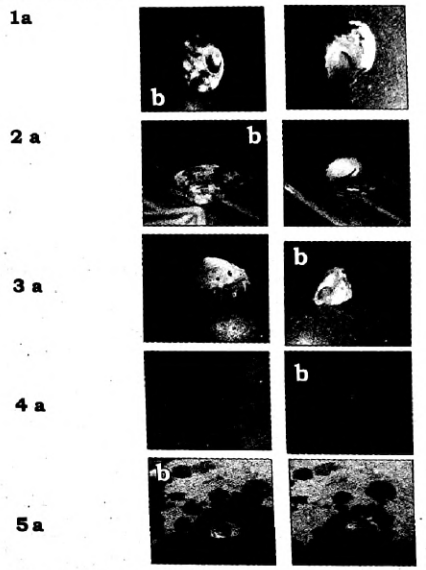
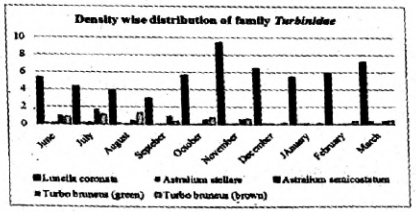


Fig.-3. Density wise distribution of Family Turbinnidae during June 2017-March 2018.



Along Gujarat waters Gohil and Kundu (2013) studied about the ecological status of Mancinella bufo at Dwarka sea coast, Gujarat.Mancinella bufo is a molluscans species that are found mostly on the upper and upper middle littoral zone of therocky intertidal substratum. Trivedi and Vachhrajani (2013) studied on intertidal distribution of Cerithium scabridum on rocky intertidal areas at Sutrapada (SP), Dhamlej (DH) and Kodinar (KO) along the coastal Saurashtra, Gujarat and reported that maximum abundance of the C. scabridum was observed in upper intertidal zone. Faladu et al. (2014) carried out study on habitat preference and population ecology of LimpetsCellana karachiensis (Winckworth) and Siphonaria siphonaria(Sowerby) at Veraval coast. The observation reported that S. siphonaria found upper littoral zone where the algal population is high.And C. karachiensis preferred the spray zone. Pandey et al. (2017) observed thatquantitative abundance of gastropods at Port Okha Reef, Gujarat. Study concluded that three species were major quantity found in the entire three littoral zones i.e.Turbo intercostalis, Turbo coronatus and Astraea semicostata. From that three species Turbo coronatus is the most dominant species at Okha in the middle littoral zone from other two zones.

So as seen from the above description there were not particular studies were recorded which were targeting to the family Turbinindae along the Gujarat waters. As described in introduction part this family of gastropod is important as food item, so this study is helpful to fisherman about fishing for Turbinindae species. The zone-wise distribution also stated that similarity with the above discussed studies. The good amount of species richness represents favorable environmental conditions to the family Turbinidae.

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REFERENCES

1. Appeltans, W., Bouchet, P., Boxshall, G. A., Fauchald, K., Gordon, D. P., Hoeksema, B. W., Poore, G.C.B., van Soest, R. W. M., Stöhr, S., Walter, T. C. and Costello, M. J. (eds). 2011. World Register of Marine Species. Accessed online at http://www.marinespecies. org. 2015 dec.10.doi.10.7717/peerj.1446.0
2. Apte, D. 2012. Field Guide to the marine life of India. First Edition.
3. Brown, D. S. 1994. Freshwater Snails of Africa and Their Medical Importance. Ed 2nd. CRC press: 608.
4. Faladu, J., Vakani, B., Poriya, P. and Kundu; R.2014. Habitat Preference and Population Ecology of Limpets Cellana karachiensis (Winckworth) and Siphonaria siphonaria (Sowerby) at Veraval Coast of Kathiawar Peninsula, India. Journal of Ecosystems DOI: http://dx.doi.org/10.1155/2014/874013
5. Garza, R. F, Ibanez, S. G., Rodriguez, P. F., Ramirez, C. T., Rebolledo, L. G., Gonzalez, A. V., Zarate, A. S. and Gonzalez, J. V. 2012. Commercially important marine mollusks for human consumption in Acapulco, Mexico. Scientific research, Natural Resources 3(1): 11-17. DOI-10.4236.
6. Giese, A. C. 1969. A new approach to the biochemical composition of the mollusc body. Oceanography Marine Biology Annu. Rev. 7: 115-129.
7. Gohil, B. and Kundu, R. 2013. Ecological status of Mancinella bufo at Dwarka sea coast, Gujarat, India. Journal of Environmental Research and Development 7(4A): 1591-1596.
8. Pandey, M., Desai, A. Y. and Mathew, K. L. 2017. Quantitative abundance of key intertidal gastropods at port Okha reef, Gujarat. International Journal of Fisheries and Aquatic Studies5(5): 188-192.
9. Strong, E. E., Gargominy, O., Ponder, W. F. and Bouchet, P. 2008. Global diversity of gastropods (Gastropoda; Mollusca) in freshwater. Hydrobiologia595: 149-166.
10. Thanonkaew, A. Benjakul, S. and Visessanguan, W. 2006. Chemical composition and thermal property of Cuttle fish (Sepiapharaonis) muscle. Journal of Food Composition and Analysis 19:127-133.
11. Trivedi, J. and Vachhrajani, K. D. 2013. Study of intertidal distribution of Cerithium scabridum, Philippi, 1848 (Mollusca, Gastropoda) along the coastal Saurashtra Gujarat, India. National Conference On Biodiversity: Status and Challenges in conservation – 'FAVEO'2013, B. N. Bandodkar Collage of Science, Thane, Maharashtra, India, pp. 130-134.
12. WoRMS.2018. World Register of Marine Species. Available from http://www.marinespecies.org at VLIZ. Accessed 2018-05-13. doi:10.14284/170 Gastropoda.Accessedat:http://www.marinespecies.org/aphia.php?p=taxdetails&id=101 on 2018-05-13.

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EFFECTS OF BIOAGENTS AND TRADITIONAL FERTILIZATION ON VEGETATIVE AND REPRODUCTIVE CHARACTERISTICS OF TOMATO (LYCOPERSICON ESCULENTUM LINN.) CV. LOCAL RED

Surya Narayan

Department of Horticulture

Kulbhasker Ashram Post Graduate College, Allahabad-211002, (U.P.), India

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ABSTRACT

To study the influence of organic and inorganic on quality and yield components in tomato to boost the productivity potential combined application microbial and chemical fertilizers had a great influence at all the growth stages of the crop. Significant differences in all parameters like, plant height, number of leaves, leaf area and number of branches due to the combined application of microbial fertilizer and chemical fertilizer. Maximum plant height (70.23 cm) was observed in Treatment-5 containing NPK+ Phosphobacteria (each 10g / pot). The maximum number of flowers (39.25) per plant was produced in T5 treatment and the maximum number of fruits (28.25/plant). The highest number of branches per plant (26.25) was recorded in treatment T5. Highest fruit weight was observed in T5 was (125.23g) Total number of leaf observed 190.33 per plant was observed in T-5, and leaf area fairly gives a good idea of photosynthetic capacity of the plant. Significant differences were noticed with regard to leaf area index among the treatments at all growth stages.

Keywords : DAP, NPK, urea Azospirillum, phosphobacteria, chemical fertilizer tomato.

INTRODUCTION

Tomato (Lycopersicon esculentum Linn.) is well responsive to nutrition and found to have great variability with varieties ,climatic conditions and soil fertility. It,s voracious feeder trait may be utilize to maximize productivity. It belongs to family Solanaceae. Plant is herbaceous, annual with erect or semispreading in habit. It also behaves like a herb. Tomato is popular vegetable and is native of Brasil. It can be grown throughout the year in almost all the states of India except at higher altitudes. The important tomato growing countries in the world are India, Bangladesh, Pakistan, China, Cyprus, Egypt, Japan, Philippines, Syria and Western Europe (Anon

2001). In India, major tomato producing states are Orissa, Bihar, Karnataka, West Bengal, Andhra Pradesh, Maharashtra and Uttar Pradesh (Anonymous, 2004). The varieties of tomato show a wide range of fruit shapes ,ranging from oval or egg-shaped to long club shaped; and from white, yellow, red with varying shades . It is quite high in nutritive value and can be well compared with brinjal. Farmers may boost-up their socio-economic status by growing tomato if assured and remunerative yield obtained from this crop.

MATERIALS AND METHODS

The experiment was carried out in a Completely Randomized Block Design (CRBD) at the Department of Horticulture, Kulbhasker Ashram Post Graduate College ,Allahabad during the year 2015-16. The mechanical compositions, physical and chemical properties of experimental soil, was examined which was used for pot culture study. The soil physical and chemical properties such as pH, Nitrogen (Jackson, 1958), Phosphorus (Jackson, 1958) and potassium (Peach and Tracey,1956) contents were analyzed. The raised seed bed of 3x1.5m size was prepared,and Tomato seeds were sown in one centimeter depth in the rows spaced at 7 cm and covered with thin layer of FYM. 25days seedlings were transplanted to the trial pot. The treatments, were T-1 DAP+ Azospirillum (10g / pot),T-2 DAP+Phosphobacteria (10g / pot), T-3 DAP+Potassium mobilizer (10g / pot),T-4 NPK Mixture +Azospirillum (13g /pot), T-5 NPK mixture +Phosphobacteria (10g / pot), T-6 NPK mixture +Potassium mobilizer (10g / pot), T-7 Urea+ Azospirillum (each 10g /pot), T-8 Urea+ Phosphobacteria (each 10g / pot), T-9 Urea+ Potassium mobilize (10g / pot), T-10 Urea (Control). (each 10g / pot) . Five plants were selected randomly from plot to record yield contributing characters. All practical managements included; mulching, weeding and other agronomic treatments were done mechanically. Irrigation was done based on plant requirements. In maturity time, fruit yield, number of fruits per plant, total plant height, shoot length, root length, number of branches per plant, number of leaves and leaf area per plant, fruit length and fruit width were measured. The collected data were analyzed statistically by F-test to examine the treatment effects and the mean differences were adjudged by Duncan Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The present study was observed that the application of microbial and chemical fertilizers combined application had a great influence at all the growth stages of the crop. Significant differences in all parameters like, plant height, number of leaves, leaf area and number of branches due to the combined application of microbial fertilizer and chemical fertilizer. Maximum plant height (70.23cm) were observed in T5 (Table 1). The data on shoot length (39.25cm), and root length (55.25cm) as influenced by the combination of biofertilizers and chemical fertilizers showed significant differences among the treatments at all the stages. The highest number of branches per plant (28.25nos) was recorded in treatment T5 . Highest fruit weight was observed in T5 (125.23g) Total number of leaf observed 190.33 per plant was observed in T-5,and leaf area fairly gives a good idea of photosynthetic capacity of the plant. Significant differences were noticed with regard to leaf area index among the treatments at all growth stages. The treatment 5 showed significantly higher leaf area (1740.23 cm2).The increase in leaf area index could be attributed to increased cell division and elongation resulting in increased leaf expansion, more number of leaves due to beneficial influence of biofertilizers which release growth promoting substances and

enhances the availability of nitrogen. From the data it appeared that flowering and fruiting of tomato were positively influenced by sources of nutrients applied. The maximum number of flowers (39.25/plant) per plant was produced in T5 treatment and the maximum number of fruits (19.33/plant).Similar results were also reported by Naidu et al., (1999) revealed that the morphological parameters were affected significantly due to the application of different combination of organics, chemicals and biofertilizers.Nitrogen fertilizer use has played a significant role in increase of crop yield (Modhej et al., 2008). Significant increase in plant height, number of leaves, number of branches and number of fruits due to influenced by environmental conditions and management practices. Prabhu et al., (2003) their studies indicated that plant height is increased by the application of organics and biofertilizers, attributed to the increased uptake of nutrients in the plants leading to enhanced chlorophyll content and carbohydrate synthesis and increased activity of hormones produced by Azospirillum and phosphate solubilizing bacteria.The Phosphobacteria increased phosphate availability in soils which in turn helped better proliferation of root growth and uptake of other nutrients to the greater extent. So that the enlargement in cell size and cell division, which might have helped in plant height, number of leaves, branches number of fruits per plant. These results are in agreement with those reports of Nanthakumar and Veeraraghavathatham (2000), Anburani and Manivannan (2002),and Wange and Kale (2004) in brinjal.Fundamentally, K+ is very water soluble and highly mobile and transported in the plants xylem (Lack and Evans, 2005). Membrane transport of potassium can be mediates either by potassium channels, utilizing the membrane potential to facilitate transport of potassium down its electrochemical gradient, or by secondary transporters. In plants, potassium act as regulator since it is constituent of 60 different enzyme systems of drought tolerance and water-use efficiency. In addition, current study has showed that to optimum growth, crops need more potassium than needed (Simonsson et al., 2007)Aminifard et al., (2010) with study responses of eggplant to different rates of nitrogen under field conditions were reported that fertilization with 100 Kg/ha nitrogen resulted in the highest average fruit weight and fruit yield. Pal et al., (2002) were reported that eggplant fruit yield increased with increase in nitrogen up to187.5 kg/ha.Only microbial treated plants could not increase the vegetative growth of plants and the reason may be that they released nutrients at a slower rate. On the other hand, the only application of inorganic fertilizer was also less effective than the combined application. These results were inconformity with the findings of Rahman etal. (1998) found that the vegetative growth and yield of berry was the highest with the combined application of manures and fertilizers. For eggplant, the integrated use of urea and poultry manure also resulted in a higher nutrient uptake Jose et al., (1988).The use of synthetic fertilizers causes a great impact on the environment and the cost of these fertilizers is increasing over the years. The farmers need to raise the crops by organic farming that will reduce the costs and will decrease the impact on the environment.

In addition, organic farming will reduce the additional burden of environmental pollution that is caused while manufacturing these synthetic fertilizers at the source (Rathier and Frink, 1989). Now it is a well established fact that organic fertilizers provide enough requirements for proper growth of the crop plant and may enhance the uptake of

Table-1. Effects of Bioagents And Traditional Fertilization on Vegetative Characteristics of Tomato (Lycopersicon esculentum Linn.) CV. Local Red

Treatments	Plant height(cm)	Shoot length (cm)	Shoot /plant(no)	Leaves/plant (cm)	Leaf area/plant (cm^2)	Root/plant (no)	Root length (cm)
T_1	55.11	23.01	14.21	125.12	1130.21	13.20	34.25
T_2	57.33	25.41	16.24	147.01	1340.25	15.22	36.22
T_3	56.12	24.01	15.21	135.11	1221.22	14.02	35.02
T_4	67.21	39.01	25.10	167.21	1520.20	24.23	56.36
T_5	70.23	39,25	28.25	190.33	1740.23	27.14	59.65
T_6	66.51	36.41	26.00	159.00	1465.01	25.02	55.25
T_7	70.44	33.00	11.25	100.33	970.23	10.35	39.36
T_8	53.25	34.02	12.23	105.23	1020.25	11.36	42.44
T_9	51.21	32.22	11.89	101.65	960.56	10.55	40.25
T_{10}	41.23	18.64	07.54	60.65	585.85	06.56	29.68
MSE+_	8.35	4.32	2.24	12.12	45.46	1.30	3.46

Table-1. Effects of Bioagents And Traditional Fertilization on Reproductive Characteristics of Tomato (Lycopersicon esculentum Linn.) CV. Local Red

Treatments	Anthesis time (DAP)	Flower/plant (no)	Fruit setting/plant (no)	Fruit /plant (kg)	Single Fruit weight (g)	Fruit yield/plant (kg)	Fruit yield (Q/ha)
T_1	73.11	23.01	14.21	11.12	63.21	1.300	350.25
T_2	75.33	25.41	16.24	13.01	85.25	1.520	352.22
T_3	74.12	24.01	15.21	14.11	73.22	1.400	351.02
T_4	69.21	35.01	25.10	17.21	103.20	2.430	572.36
T_5	68.23	39.25	28.25	19.33	125.23	2.740	575.65
T_6	69.51	36.41	25600	16.00	117.01	2.520	571.25
T_7	78.44	33.00	11.25	10.33	98.23	1.030	355.36
T_8	81.25	34.02	12.23	11.23	103.25	1.130	358.44
T_9	79.21	32.22	11.89	10.65	39.56	1.050	356.25
T_{10}	99.23	18.64	07.54	06.65	19.85	0.656	245.68
MSE+_	9.35	5.32	3.24	1.12	4.46	0.220	35.36

nutrients, increase the assimilation capacity and will stimulate the hormonal activity as well (Tomati et al., 1990). The use of biofertilizers useful as it increases soil porosity, aeration and water holding capacity, therefore a practically paying proposal. Azospirillum, nitrogen fixing organism has been reported to be beneficial and economical on several crops. They improve the growth and yield as well as productivity of the crop. Vanangamudi et al., (1989) also reported similar increase in per cent germination and shoot length of chilli with increase in nitrogen application (0 150 kg/ha). Prabhu et al. (2003) reported that increased N and P rates increased the plant height, branch number per plant in brinjal phosphate solubilizing Bacteria (PSB) are a group of beneficial bacteria capable of hydrolysing organic and inorganic phosphorus from insoluble compounds. Chen et al., (2006) P-solubilization ability of the microorganisms is considered to be one of the most important traits associated with plant phosphate nutrition P-solubilizers are biofertilizers which solubilizes the fixed phosphorus in soil and makes it available for plants. The microbes, Fraturia aurantia belonging to the family Pseudomonaceae, is a beneficial bacteria capable of mobilizing potash to plants in all types of soil especially, low K Content soil. Such bacterial population in the soil form can increase the availability of potash to the plants. Wange and Kale (2004) reported that, the results revealed significant improvement in vegetative characters such as plant height and number of leaves per plant in brinjal over the recommended biofertilizer with combine chemical fertilizer. The information on the role of organics on morpho-physiological traits in tomato is meager. Hence, there is a need to study the influence of organic and inorganic on quality and yield components in tomato to boost the productivity potential.

The cost of inorganic fertilizers has been enormously increasing to an extent that they are out of reach of the poor, small and marginal farmers. It has become impractical to apply such costly inputs for a crop of marginal returns. The use of biofertilizers in such situation is therefore a practically paying proposal. Based on the above results, it was concluded that, the application of microbial and chemical fertilizers was found more beneficial and significantly improved morpho-physiological traits, growth parameters, and yield components in tomato. The benefit cost ratio was found lesser in using both biofertilizer and chemical fertilizer compared to using chemical fertilizer alone in tomato crop cultivation.

REFERENCES

1. Aminifard, M.H., Aroiee, H., Fatemi, H., Ameri, A., Karimpour, S., 2010: Responses of Eggplant (Solanum Melongenal L.) to different rates of nitrogen under field conditions. JCEA, 11(4): 453-458.
2. Anburani, A., Manivannan, K. 2002. Effect of integrated nutrient management on growth in brinjal (Solanum melongena L.) CV. Annamalai. South IndianHorticulture, 50(4-6): 377-386.
3. Anon. 2004. Report of the Ad Hoc technical Expert Group on Forest Biological Diversity. (UNEP/CBD/SBSTTA/7/6). Anonymous, Food and Agriculture Organization, Production Year book, 54: 148-149.
4. Chen, G.C., He, Z.L, Stoffella, P.J, Yang, X.E., Yu, S., 2006. Calvert D, Use of dolomite phosphate rock (DPR) fertilizers to reduce phosphorus leaching from sandy soil. Environmental Pollution, 139: 176-182.
5. Gomez, K.A., Gomez, A.K. 1958.

Statistical Procedures for Agricultural Research.2 nd edn. John Wiley and Sons. New York. 207-215. Jackson ML, Soil Chemical Analysis. 183-204,

6. Prentice Hall Inc., USA. Jose, D., K.G., Shanmugavelu, S., Thamburaj. 1988. Studies on the efficiency of organic vs. inorganic form of nitrogen in brinjal. Indian Journal of Horticulture 45: 100-103.
7. Lack, A.J., Evans, D.E. 2001. Instant notes in plant biology, 1st edn. Oxford: Bios Scienti c Publishers.
8. Modhej, A., Naderi, A., Emam, Y., Aynehband, A., Normohamadi, G.H.2008. Effects of post-anthesis heat stress and nitrogen levels on grain yield in wheat (T. durum and T. aestivum) genotypes. Int. J. Plant Production, 2, 257-267.
9. Naidu, A.K., Kushwah, S.S., Dwivedi, Y.C. 1999. Performance of organic manures, bio and chemical fertilizers and their combinations on microbial population of soil and growth of okra. Jawaharalal Neharu Krishi Vishwa Vidhyalaya Research Journal, 33 (1-2): 34-38.
10. Nanthakumar, S., Veeraraghavathatham, D. 2000. Effect of integrated nutrient management on growth parameters and yield of brinjal (Solanummelongena L.) cv. PLR-1. SouthIndian Horticulture, 48(1-6): 31-35.
11. Pal, S., Saimbhi, M.S., Bal, S.S. 2002.Effect of nitrogen and phosphoruslevels on growth and yield of brinjalhybrid (Solanum melongena L.). J.Veg. Sci. 29, 9091.
12. Peach, K., Tracey, M.V. 1956. ModernMethods of Plant Analysis. Vol. I, Springer Verlag, Berlin.
13. Prabhu, M., Veeraraghavathatham, D.,Srinivasan, K. 2003 Effect of nitrogenand phosphorus on growth and yield ofbrinjal hybrid COBH-1. South Indian Horticulture, 51(1-6): 152-156.
14. Rahman, M.H., Hossain, M.A., Kawai, K.,Hossain, M.A. 1998. Potentiality of swamp for fish culture in Bangladesh.Japan Aquaculture Society,Svisanzoshku. 46 (4):481-486.
15. Rathier, T.M., Frink, C.R. 1989. Nitrate inrunoff water from container grown juniper and alberta spruce underdifferent irrigation and N fertilizationregimes. J Environ Horticul (7) (1):32 35.
16. Simonsson, M., Andersson, S., Andrist-Rangel, Y., Hillier, S., Mattsson, L.,Obom, I. 2007. Potassium release and fixation as a function of fertilizer application rate and soil parent material. Geoderma. 140:188-198.
17. Tomati , U., Galli, E., Grappelli, A., DiLena,G. 1990. Effect of earthworm casts on protein synthesis in radish (Raphanus sativum) and lettuce (Lactuca sativa) seedlings. Biology and Fertility of Soils, 9: 288 289.
18. Vanangamudi, K., Subramanian, K.S. 1989. Bhaskaran M, Irrigation and nitrogen management for quality seed production. Seeds and Farms 15 (9-10): 28-31.
19. Wange, S.S., Kale, R.H. 2004. Effect of biofrtilizers under graded nitrogen levels on brinjal crop. Journal of Soils and Crops, 14(1): 9-11.

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STUDY OF DIVERSITY IN AVIAN FAUNA AT COLLEGE OF MATERIAL MANAGEMENT (CMM), JABALPUR, M.P.

K K Dube[1], Shivam Dubey[2], Rita Bhandari[3] and Jaishree Sharma[4]

[1, 2 and 4]Government Science College, Jabalpur (M.P.), India

[3]Government OFK College, Jabalpur (M.P.), India

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ABSTRACT

The present study was done at the College of Material Management, famously known as CMM, situated on Sita Pahadi in Jabalpur in the state of Madhya Pradesh. The college was established in the year 1925 under the guidelines of the Indian Army Ordnance Corps (IAOC) School of Instructions. In 1939 its name was changed to IAOC Training Centre and again as AOC School in 1950. Finally in 1987, it received its present name as College of Material Management, which is still in usage. In the present study, a total of 118 avian species have been recorded belonging to 45 families.

Keywords : CMM, Jabalpur, birds, diversity.

INTRODUCTION

The CMM is a premier defence college which was founded and is funded by the Ministry of Defence, Govt of India. However its administrative control lies with the Army HQ, New Delhi, presently the college is affiliated to Rani Durgawati Vishwa Vidyalaya, Jabalpur. The University Grant Commission has granted the recognition under section 12 B and 12 F in the years 1992 and 1998 respectively. Also its courses in different fields of management studies are approved by the All India Council for Technical Education. At present the institute holds the capacity to impart required training as well as education to about 1500 students at any given time. Defence personnel from friendly foreign countries, Para Military Forces and State Police Organizations are also allowed to receive proper training in this institute. The college campus is spread over an area of approximately 1200 acres over the hill and comprising of independent buildings for educational as well as residential causes. Whole campus is divided into different sections according their usage of the space. The campus surroundings are full of lush green vegetation which provides as excellent spot for nesting and breeding of the avian fauna. Due to its hilly surroundings, it is a great spot for all types of flora and fauna to flourish. A great amount of efforts by the administration has been put into conserve the existing biodiversity present here

and more attempts are in practice to increase the greenery in the area. The CMM is one of the great spot in Jabalpur for birding as the major part of the college campus is surrounded by the woods. In current study, apart from the CMM campus, the data survey was conducted at nearby Priyadarshani Colony and Nehra Company as well. In 2008, Ghosh et al. published a detailed account of avian fauna from the states of Madhya Pradesh (including Chhattisgarh), reporting altogether 449 species. Talmale et al.,in 2012 published an account of 173 bird species from Singhori Wildlife Sanctuary (Raisen District), Madhya Pradesh.In the present study, a total of 118 avian species have been recorded belonging to 45 families. The data is as under -

S. No.	Family	Common Name	Scientific Name	Abundance	Local Status	IUCN Status
1	Phasianidae	Painted Francolin	*Francolinus pictus*	UC	R	LC
2		Grey Francolin	*Francolinus pondicerianus*	C	R	LC
3		Grey Francolin	*Francolinus pondicerianus*	C	R	LC
4		Red Junglefowl	*Gallus gallus*	C	R	LC
5		Indian Peafowl	*Pavo cristatus*	C	R	LC
6	Turnicidae	Small Buttonquail	*Turnix sylvaticus*	UC	R	LC
7		Barred Buttonquail	*Turnix suscitator*	FC	R	LC
8	Anatidae	Lesser Whistling Duck	*Dendrocygna javanica*	C	R	LC
9		Knob-billed Duck	*Sarkidiornis melanotos*	C	R	LC
10		Indian Spot-billed Duck	*Anas poecilorhyncha*	C	R	LC
11		Northern Pintail	*Anas acuta*	C	WM	LC
12		Common Teal	*Anas crecca*	C	WM	LC
13	Ciconiidae	Painted Stork	*Mycteria leucocephala*	C	R	NT
14		Wooly-necked Stork	*Ciconia episcopus*	C	R	VU
15		Lesser Adjutant	*Leptoptilos javanicus*	UC	WM	VU
16	Threskiornithidae	Black-headed Ibis	*Threskiornis melanocephalus*	C	WM	NT
17		Eurasian Spoonbill	*Platalea leucorodia*	FC	R	LC
18	Ardeidae	Yellow Bittern	*Ixobrychus sinensis*	FC	R	LC
19		Cinnamon Bittern	*Ixobrychus cinnamomeus*	FC	R	LC
20		Indian Pond Heron	*Ardeola grayii*	C	R	LC
21		Grey Heron	*Ardea cinera*	FC	R	LC
22		Purple Heron	*Ardea purpurea*	UC	R	LC
23		Cattle Egret	*Bubulcus ibis*	C	R	LC
24		Great Egret	*Casmerodius albus*	C	R	LC
25		Intermediate Egret	*Mesophoyx intermedia*	C	R	LC
26		Little Egret	*Egretta garzetta*	C	R	LC
27	Phalacrocoracidae	Little Cormorant	*Phalacrocorax niger*	C	R	LC
28		Great Cormorant	*Phalacrocorax carbo*	FC	WM	LC

S. No.	Family	Common Name	Scientific Name	Abundance	Local Status	IUCN Status
29	Falconidae	Common Kestrel	*Falco tinnunculus*	FC	WM	LC
30	Accipitridae	Black-winged Kite	*Elanus caeruleus*	C	R	LC
31		Black Kite	*Milvus migrans*	C	R	LC
32		Oriental Honey Buzzard	*Pernis ptilorhynchus*	C	R	LC
33		Egyptian Vulture	*Neophron percnopterus*	FC	R	EN
34		Short-toed Snake Eagle	*Circaetus gallicus*	UC	R	LC
35		Crested Serpent Eagle	*Spilornis cheela*	FC	R	LC
36		Shikra	*Accipiter badius*	C	R	LC
37	Rallidae	White-breasted Waterhen	*Amaurornis phoenicurus*	C	R	LC
38		Purple Swamphen	*Porphyrio porphyrio*	C	R	LC
39		Common Moorhen	*Gallinula chloropus*	C	R	LC
40	Burhinidae	Indian Thick-knee	*Burhinus indicus*	FC	R	LC
41		Great Thick-knee	*Esacus recurvirostris*	UC	R	NT
42	Jacanidae	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	FC	R	LC
43		Bronze-winged Jacana	*Metopidius indicus*	C	R	LC
44	Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	C	R	LC
45		Little Ringed Plover	*Charadrius dubius*	C	R	LC
46	Rostratulidae	Greater Painted Snipe	*Rostratula benghalensis*	FC	R	LC
47	Scolopacidae	Common Snipe	*Gallinago gallinago*	C	WM	LC
48		Eurasian Curlew	*Numenius arquata*	UC	WM	NT
49		Spotted Redshank	*Tringa erythropus*	FC	WM	LC
50		Common Sandpiper	*Actitis hypoleucos*	C	WM	LC
51	Pteroclidae	Painted Sandgrouse	*Pterocles indicus*	R	R	LC
52	Columbidae	Rock Pigeon	*Columba livia*	C	R	LC
53		Oriental Turtle Dove	*Streptopelia orientalis*	FC	WM	LC
54		Eurasian Collared Dove	*Streptopelia decaocto*	FC	R	LC
55		Spotted Dove	*Stigmatopelia chinensis*	C	R	LC
56		Laughing Dove	*Stigmatopelia senegalensis*	C	R	LC
57		Yellow-footed Green Pigeon	*Treron phoenicopterus*	C	R	LC
58		Emerald Dove	*Chalcophaps indica*	UC	R	LC
59	Psittacidae	Alexandrine Parakeet	*Psittacula euparita*	UC	R	NT
60		Rose-ringed Parakeet	*Psittacula krameri*	C	R	LC
61		Plum-headed Parakeet	*Psittacula cyanocephala*	C	R	LC

S. No.	Family	Common Name	Scientific Name	Abundance	Local Status	IUCN Status
62	Cuculidae	Jacobin Cuckoo	*Clamator jacobinus*	FC	SM	LC
63		Common Hawk Cuckoo	*Hierococcyx varius*	C	R	LC
64		Asian Koel	*Eudynamys scolopaceus*	C	R	LC
65	Tytonidae	Barn Owl	*Tyto alba*	C	R	LC
66	Strigidae	Jungle Owlet	*Glaucidium radiatum*	FC	R	LC
67		Spotted Owlet	*Athene brama*	C	R	LC
68		Indian Scops Owl	*Otus bakkamoena*	UC	R	LC
69	Caprimulgidae	Indian Nightjar	*Caprimulgus asiaticus*	FC	R	LC
70	Upupidae	Common Hoopoe	*Upupa epops*	C	R	LC
71	Alcedinidae	Stork-billed Kingfisher	*Pelargopsis capensis*	FC	R	LC
72		White-throated Kingfisher	*Halcyon smyrnensis*	C	R	LC
73		Common Kingfisher	*Alcedo atthis*	C	R	LC
74		Pied Kingfisher	*Ceryle rudis*	C	R	LC
75	Meropidae	Green Bee-eater	*Merops orientalis*	C	R	LC
76	Bucerotidae	Indian Grey Hornbill	*Ocyceros birostris*	C	R	LC
77	Ramphastidae	Coppersmith Barbet	*Megalaima haemacephala*	C	R	LC
78	Picidae	Eurasian Wryneck	*Jynx torquilla*	UC	WM	LC
79		Yellow-crowned Woodpecker	*Dendrocopos mahrattensis*	FC	R	LC
80		White-naped Woodpecker	*Chrysocolaptes festivus*	FC	R	LC
81	Pittidae	Indian Pitta	*Pitta brachyura*	FC	SM	LC
82	Campephagidae	Large Cuckooshrike	*Coracina macei*	FC	R	LC
83		Black-headed Cuckooshrike	*Coracina melanoptera*	UC	SM	LC
84		Small Minivet	*Pericrocotus cinnamomeus*	C	R	LC
85		Long-tailed Minivet	*Pericrocotus ethologus*	UC	WM	LC
86		Scarlet Minivet	*Pericrocotus speciosus*	FC	R	LC
87	Dicruridae	Black Drongo	*Dicrurus macrocerus*	C	R	LC
88		Ashy Drongo	*Dicrurus leucophaeus*	FC	WM	LC
89	Oriolidae	Indian Golden Oriole	*Oriolus kundoo*	FC	R	LC
90	Corvidae	Rufous Treepie	*Dendrocitta vagabunda*	C	R	LC
91		Indian Jungle Crow	*Corvus macrorhynchos*	C	R	LC
92		House Crow	*Corvus splendens*	C	R	LC
93	Pycnonotidae	Red-whiskered Bulbul	*Pycnonotus jacosus*	UC	R	LC
94		Red-vented Bulbul	*Pycnonotus cafer*	C	R	LC

S. No.	Family	Common Name	Scientific Name	Abundance	Local Status	IUCN Status
95	Cisticolidae	Jungle Prinia	*Prinia sylvatica*	FC	R	LC
96		Ashy Prinia	*Prinia socialis*	C	R	LC
97		Plain Prinia	*Prinia inornata*	C	R	LC
98	Sylviidae	Common Chiffchaff	*Phylloscopus collybita*	C	WM	LC
99	Timaliidae	Common Babbler	*Turdoides caudata*	C	R	LC
100		Jungle Babbler	*Turoides striata*	C	R	LC
101	Zosteropidae	Oriental White-eye	*Zosterops palpebrosus*	C	R	LC
102	Sturnidae	Jungle Myna	*Acridotheres fuscus*	FC	R	LC
103		Common Myna	*Acridotheres tristis*	C	R	LC
104		Brahminy Starling	*Sturnia pagodarum*	C	R	LC
105	Muscicapidae	Oriental Magpie Robin	*Copscychus saularis*	C	R	LC
106		Indian Robin	*Saxicoloides fulicatus*	C	R	LC
107		Pied Bushchat	*Saxicola caprata*	C	R	LC
108		Verditer Flycatcher	*Eumyias thalassinus*	FC	WM	LC
109	Chloropseidae	Golden-fronted Leafbird	*Chloropsis aurifrons*	FC	R	LC
110	Nectariniidae	Purple Sunbird	*Cinnyris asiaticus*	C	R	LC
111	Passeridae	House Sparrow	*Passer domesticus*	C	R	LC
112		Chestnut-shouldered Petronia	*Gymnoris xanthocollis*	C	R	LC
113	Estrildidae	Red Avadavat	*Amandava amandava*	C	R	LC
114		Scaly-breasted Munia	*Lonchura punctulata*	C	R	LC
115	Motacillidae	Yellow Wagtail	*Motacilla flava*	FC	WM	LC
116		Citrine Wagtail	*Motacilla citreola*	FC	WM	LC
117		Paddyfield Pipit	*Anthus rufulus*	C	R	LC
118		Tree Pipit	*Anthus trivialis*	FC	WM	LC

Table-1. List of avian species recorded in CMM, Jabalpur

Abbreviations ABUNDANCE : C=Common, FC=Fairly Common, UC=Uncommon, R=Rare LOCAL STATUS : R=Resident, WM=Winter Migrant, SM=Summer MigrantIUCN STATUS : CR=Critically Endangered, EN=Endangered, VU=Vulnerable, NT=Near Threatened

Out of these 118 species, maximum number of species recorded from the family Ardeidae (09) while on the other hand family Falconidae, Rostratulidae, Pteroclidae, Tytonidae, Caprimulgidae, Upupidae, Meropidae, Bucerotidae, Ramphastidae, Pittidae, Oriolidae, Sylviidae, Zosteropidae, Chloropseidae and Nectariniidae has one species each which represented the minimum number.

Table-2. Family wise distribution of bird species

S. N.	Family	Number of Species
1	Ardeidae	9
2	Accipitridae	7
3	Columbidae	7
4	Phasianidae	5
5	Anatidae	5
6	Campephagidae	5
7	Scolopacidae	4
8	Alcedinidae	4
9	Muscicapidae	4
10	Motacillidae	4
11	Ciconiidae	3
12	Rallidae	3
13	Psittacidae	3
14	Cuculidae	3
15	Strigidae	3
16	Picidae	3
17	Corvidae	3
18	Cisticolidae	3
19	Sturnidae	3
20	Turnicidae	2
21	Threskiornithidae	2
22	Phalacrocoracidae	2
23	Burhinidae	2
24	Jacanidae	2
25	Charadriidae	2
26	Dicruridae	2
27	Pycnonotidae	2
28	Timaliidae	2
29	Passeridae	2
30	Estrildidae	2
31	Falconidae	1
32	Rostratulidae	1
33	Pteroclidae	1
34	Tytonidae	1
35	Caprimulgidae	1
36	Upupidae	1
37	Meropidae	1
38	Bucerotidae	1
39	Ramphastidae	1
40	Pittidae	1
41	Oriolidae	1
42	Sylviidae	1
43	Zosteropidae	1

If we study about the relative abundance of the avian species in the study area, it can be inferred that out of the 118 reported species, 96 species are resident while 19 species are winter migrants to the area and 3 species are summer migrant. The winter migrant included Northern Pintail, Common Teal, Lesser Adjutant, Common Kestrel, Common Snipe, Eurasian Curlew, Spotted Redshank, Common Sandpiper, Oriental Turtle Dove, Eurasian Wryneck, Long-tailed Minivet, Ashy Drongo, Common Chiffchaff, Verditer Flycatcher, Yellow Wagtail, Citrine Wagtail, Tree Pipit, Black-headed Ibis and Great Cormorantwhile on the hand, Jacobin Cuckoo, Indian Pitta and Black-headed Cuckooshrikeare listed as summer migrant.

Table-3. Showing relative abundance of the bird species

Local Abundance	Number of Species
R	96
SM	3
WM	19
Total Species	118

In thepresent data collection, of the 118 species, there are 8 species which are listed in the IUCN Red Data list. Species like Egyptian Vulture, Neophron percnopterusis listed as endangered. Painted Stork, Mycteria leucocephala, Black-headed Ibis, Threskiornis melanocephalus,Great Thick-knee, Esacus recurvirostris, Eurasian Curlew, Numenius arquata and Alexandrine Parakeet, Psittacula euparita are listed as near threatened and Wooly-necked Stork, Ciconia episcopus and Lesser Adjutant, Leptoptilos javanicus are listed as vulnerable.

Table-4. List of number of species as per their IUCN status

IUCN Status	Number of Species
EN	1
LC	110
NT	5
VU	2
Total Species	118

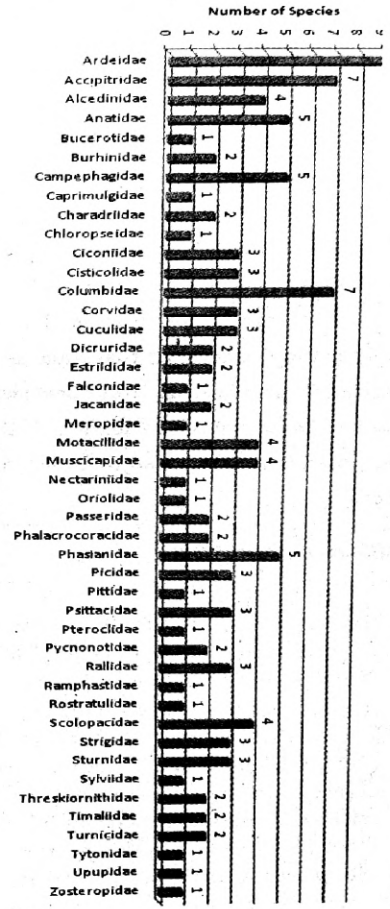
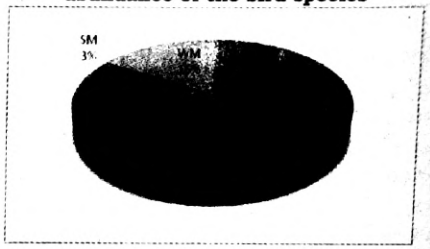


Fig 1. Graph showing Family wise distribution of bird species

Fig.-2. Pie chart showing relative abundance of the bird species



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REFERENCES

1. Ghosh S, Basu Roy S, Datta BK, Sett AK (2008) Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, 15(Part- 2), Aves. 1-152 (Published by the Director, Zoological Survey of India, Kolkata).
2. Talmale SS, Limje ME, and Sambath S (2012) Avian diversity of Singhori Wildlife Sanctuary,Raisen District, Madhya Pradesh. Biological Forum – An International Journal, 4(2): 52-61.

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ACCUMULATION OF CADMIUM AND CHROMIUM IN AMARANTHUS GROWN IN SEWAGE IRRIGATED SOILS OF ALLAHABAD

Dinesh Mani, Vipin Sahu and Bechan Singh
Sheila Dhar Institute of Soil Science, Department of Chemistry
University of Allahabad, Allahabad-211002, (U.P.), India

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ABSTRACT

A study was conducted to observe the accumulation of Cd and Cr in Amaranthus (leafy vegetable crop) grown in sewage irrigated soils of Mumfordgunj, Jhunsi and Naini (Allahabad). The study revealed that Amaranthus grown in the sewage irrigated soils accumulated more Cd and Cr. It was observed that Cd and Cr accumulated on the surface of the soil (0-20, 20-40 and 40-60 cm.) more (Cd 1.20 mg kg-1 and Cr 8.36 mg kg-1) respectively. Cd content was found more the leaves of Amaranthus grown in sewage irrigated soil. The study concluded that Amaranthus crop grown in sewage irrigated soils accumulated Cd and Cr in different parts which may pose a potential threat to human health. In samples the leafy vegetables contained considerably higher levels for both metals as compared to underground vegetables and least in over ground vegetables.

Keywords : Accumulation, sewage, heavy metals, amaranthus

INTRODUCTION

Vegetables are important part of human diet throughout the world, as they are rich sources of essential important nutrients, such as carbohydrates, proteins, vitamins, minerals, trace elements as well as antioxidants and metabolites,(Shuaibu, I.K. et. al., 2013 and Ramteke, S. et. al., 2016). They also play an important role to control various chronic diseases by acting as buffering media for acid substances formed during digestion of food (Ramteke, S. et. al., 2016). The accumulation of heavy metals in plant vary with factors such as climate, soil properties, atmospheric deposition, plant species, and soil to plant factors of metals (Aktauzzaman, M. et. al., 2013 and Hamid, A. et. al., 2016).

In general, this resource contains substantial amounts of beneficial nutrients and toxic pollutants, which are creating opportunities and problems for agricultural production, respectively (Alghobar and Suresha, 2017).

Excessive accumulation of heavy metals in agricultural soils through irrigation wastewater threat resident's lives who consume crops and/or vegetables grown in contaminated areas. Heavy metal contamination of foodstuffs is the first indicator of food safety and quality (Marshall, 2004; Radwan and Salama, 2006; Khan et al., 2008). Contaminated food by heavy metals has toxic effects on human health and can seriously deplete some essential nutrients in the body that are further responsible of decreasing immunological defenses, intrauterine growth retardation, impaired psychosocial faculties, disabilities associated with malnutrition and high prevalence of upper gastrointestinal cancer rates (Iyengar and Nair, 2000; Türkdogan et al., 2003; Arora et al., 2008). Unlike organic contaminants, heavy metals are not biodegradable, and pose a critical concern to living organisms and the environment through their action as carcinogenic and mutagenic compounds (Wu et al., 2018).

Several studies show the potential risk to human health due to the accumulation of heavy metals in plants (Chauhan and Chauhan, 2014; Balkhair and Ashraf, 2016; Alghobar and Suresha, 2017). The level of health risks posed by wastewater with heavy metals was determined using different indices, including the transfer factor (TF), daily intake of metals (DIM) and health risk index (HRI) or health quotient (HQ) (Liu et al., 2005; Khan et al., 2008).

Heavy metals such as Cd and Pb have been shown to have carcinogenic effects (Jaishankar et al., 2014). Other metal elements such as copper (Cu) and zinc (Zn) are essential nutrients for human health, but they can be toxic in high concentrations (Rahman et al., 2014).

Heavy metal elements, such as lead (Pb), cadmium (Cd), arsenic (As), etc., have toxic effects on human health. Toxic metals can accumulate persistently in the body over a lifetime. Pb can adversely influence the intelligence development of children, cause excessive lead in blood, and induce hypertension, nephropathy and cardiovascular disease (Ekon, E.B. et al., 2006, Goyer, R. A. et al., 1993 and Navas-Acien A. et al.,). Chronic Cd exposure can cause acute toxicity to the liver and lungs, induce nephrotoxicity and osteotoxicity, and impair function of the immune system (Klaassen, C. D. et al., 1999, Klaasser., C.D., 2009 and Patrick, L. et al., 2003). There have been some studies that have focused on Cd contaminated soil and the selection of vegetable species or cultivars with low heavy metal accumulation (yang, Y. et al., 2008, Yang, J. et al., 2010 and Dunbar, K. R., 2003).

In this study field experiments were carried out on accumulation of Cd and Cr on sewage irrigated contaminated soils near Mumfordgunj Jhunsi and Naini (Allahabad Region) and amaranthus (leafy vegetable) was grown as test crop. The main purposes of this study was to investigated the accumulation of Cd and Cr in the edible parts of amaranthus grown in soils of different depth wise (0-20, 20-40 and 40-60) to assess to human health of vegetables consumption on residents. After 24 hr of the treatment, seed were sown. Soil moisture was maintained by irrigating the amaranthus at interval of 6-7 days.

MATERIALS AND METHODS

Experimental site

The experimental site is situated in Northern India at 24058'N latitude and 80056'E longitude on south-east facing slopes of comparable inclination at altitudes between 170 and 85 m above sea level. A sand clay loam soil, derived from sewage-sludge irrigated indo-gangetic alluvial soils of SDI farm situated on

the confluence of Ganga and Yamuna alluvial deposit, was sampled from Allahabad city, India. The properties of the soil were; pH 7.7, EC 0.26 dSm-1, organic carbon (OC) content 0.58%, total N 0.07%, total P 0.04%, CEC 18.7 C mol (P)kg-1, Cd 3.00-3.40mgkg-1 and Cr 5.19-6.38 mgkg-1. The texture comprised of sand (>0.2mm) 55.0%, silt (0.002-0.2mm) 20.0% and clay (<0.002mm) 24.0%.

Soil sampling and extraction of heavy metals from soil

In each sampling unit, soil samples were drawn from several spots in a zigzag pattern leaving about 2 m area along the field margins. Silt and clay were separated by Pipette method and fine sand by decantation. For total Cd and Cr content, 2 gram of soil was mixed in 5 ml of HNO3 (16M, 71%) and 5ml of HClO4 (11M, 71%). The composite was heated up to dryness. The volume was made up to 50 ml with hot distilled water. The clean filtrate was used for the estimation of the heavy metals (Cd, and Cr) by Atomic Absorption Spectrophotometer (AAS) (AAnalyst600, Perkin Elmer Inc., MA, USA).

Soil physico-chemical analysis

Soil pH was measured with 1:2.5 soil water ratio using electrical digital pH meter. Double distilled water was used for the preparation by chromic acid digestion method, cation exchange capacity (CEC) by neutral 1 N ammonium acetate solution, total nitrogen by digestion mixture (containing sulphuric acid) selenium dioxide and salicylic acid) using micro-Kjeldahl method, Glass Agencies, Ambala, India (Kumar and Mani 2010), and total phosphorus by hot plate digestion with HNO3(16M, 71%) and extraction by standard ammonium molybdate solution (Chopra and Kanwar,1999; Kumar and Mani 2010).

Plant analysis

Plants were harvested after 60 days (harvesting stage). Samples were carefully rinsed with sewage-irrigated water followed by 0.2% detergent solution, 0.1N HCl, de-ionized water, and double distilled water.

Later samples were dried in a hot-air oven at a temperature of 45°C, and ground to a fine powder. Plant dry biomass weight was recorded. One gram of ground plant material was digested with 15ml of tri-acid mixture (Kumar and Mani, 2010) containing conc. HNO_3 (16M, 71%), H2SO4 (18M, 96%) and $HClO_4$ (11M, 71%) in 5:1:2), heated on hot plate at low heat (600C) for 30 minutes and total heavy metals were determined by the aforesaid Spectrophotometer.

Statistical Analysis

Statistical analysis data were analyzed by factors with the help of the sum of square (SS) and degree of freedom (DF). The standard error (SE) is given by where, VE is the variance due to the error, n is the number of replications, and the critical difference (CD) is given by CD = SEdiff x t5% (t5% = 2.042 at DFerror =30 was observed) and standard deviation (Syx) were determined in accordance with Motulsky and Christopoulos (2003). MS-Excel 2007 software was used for drawing figures.

RESULTS AND DISCUSSION

Sewage- irrigated soils were found to be mildly phytotoxic (Li et al., 2010),

The extent of contamination due to anthropogenic activity is generally judged by making comparisons of the metal contaminated soils with adjacent non polluted ones as there is no direct reference level due to wide variations in naturally occurring heavy metals in soils. Same criteria have been followed in present study to determine the distribution and extent of heavy metal pollution in sewage irrigated soils. Data on Cd, and Cr in soils are presented in Table 1 in 2. Concentration of these metals in sewage irrigated soils varied markedly.

In sewage irrigated soil (T9) maximum Cd accumulation was found in 0-20, 20-40 and 40-60 cm. depth wise soils from 1.20 mg kg-1, 0.12 mg kg-1 and 0.52 mg kg-1, respectively (Table-1).

The application of sewage irrigated soil increased the concentration of Cr observation that depths (0-20, 20-40 and 40-60 cm.). Sewage water (T9) increased maximum Cr accumulation in depth soil from 8.36 mg kg-1, 6.43 mg kg-1 and 3.82 mg kg-1, respectively (Table-2). Similar result was found by Lone et al. (2013). The extent of Chromium built up to sewage irrigated soils was significant in 0-20 and 20-40 cm. depth. A gradual decline in its concentration was recorded with increase in distance from the point of sewage discharge and down the profiles. Data further indicate that the enrichment of Cr due to discharge of sewage water and sludge was observed mostly in the surface layer with very little mobility down the profile.

Table-1. Depth-wise accumulation of Cd in sewage irrigated soil

Treatment	Cd accumulation in mg kg^{-1}		
	Depth of soil sampling (cm.)		
	0-20	20-40	40-60
T_1	0.24	0.18	0.07
T_2	0.28	0.20	0.10
T_3	0.35	0.33	0.21
T_4	0.45	0.56	0.24
T_5	0.56	0.44	0.31
T_6	0.68	0.48	0.34
T_7	0.79	0.36	0.45
T_8	0.89	0.62	0.24
T_9	1.20	0.12	0.52

SE = 0.16 CD = 0.33

Fig.-1. Depth-wise accumulation of Cd in sewage irrigated soil

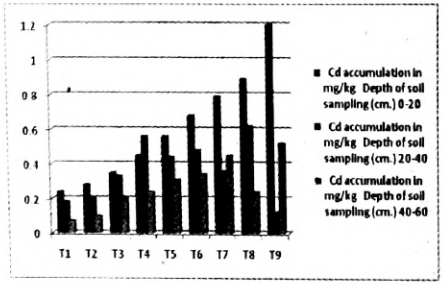


Table-2. Depth-wise accumulation of Cr in sewage irrigated soil

Treatment	Cr accumulation in mg kg^{-1}		
	Depth of soil sampling (cm.)		
	0-20	20-40	40-60
T_1	0.96	0.74	0.42
T_2	1.24	1.12	0.47
T_3	2.15	0.89	0.97
T_4	3.56	1.23	1.32
T_5	4.63	1.20	1.76
T_6	5.45	2.79	2.31
T_7	6.75	3.43	2.56
T_8	7.68	4.73	3.69
T_9	8.36	6.43	3.82

SE = 0.72 CD = 1.53

FIG.-2. Depth-wise accumulation of Cr in sewage irrigated soil

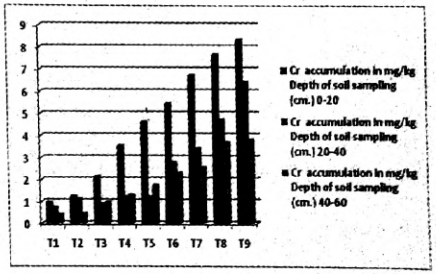


Fig.-3. Accumulation of Cd (mg kg-1) in Amaranthus

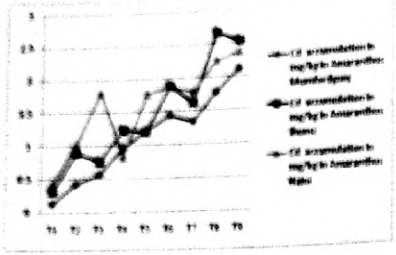
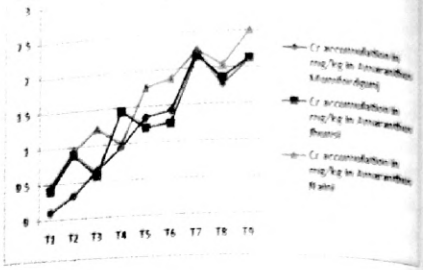


Fig.-4. Accumulation of Cr (mg kg-1) in Amaranthus



Cadmium

The Cadmium accumulation in all treatment varied from 0.12 to 2.66 mg kg -1 (figure-3) and Cd concentration in amaranthus. Same Cd concentration reported by many researchers as like (Liu et al. 2005) in China (0.03-0.73 mg kg-1) and Egypt (0.002-0.08 mg kg-1) (Doghien et al. 2004) where as it is very closed which the findings of (Sharma et al.2007) (0.5-4.36 mgkg-1) in vegetables from Varanasi, India. Build-up of heavy metals in crop plants grown in the soil. However, Cd concentration in Amaranthus grown in tap water irrigated soils indicated safe background levels. Chitdeshwari et al. (2002) reported that increased levels of sewage water increased the uptake of heavy metals including Cd and Cr in Amaranthus crop.

Chromium

It is obvious from the data presented in Table 2 and fig. 4 that the accumulation of chromium concentration varied from 0.1 to 2.5 mg kg-1 and in non-leafy vegetables Cr concentration varied from non-detectable to 2.14 mg kg-1 of treatment which are coherent with various published studies. The higher concentrations were found in leafy vegetables then underground vegetables and least in overground vegetables in maximum in Naini sites and lower in Jhunsi sites.

CONCLUSION

Our work has focused on the study of the application on the accumulation of heavy metals in soils and the assessment of residual toxicities. In our results the richness was reflected in the accumulation of these elements in the sewage irrigated soils. The concentration of Cd and Cr was significantly in all sewage irrigated soils (T_1 to T_9) at all three depth (0-20, 20-40 and 40-60 cm.), in sides Mumfordgung, Jhunsi and Naini, respectively. The highest accumulation was found in Naini and lowest in Jhunsi. The pattern of distribution of heavy metals is uniform. However, Cd and Cr concentration are highest at the surface horizons and decreased sharply with depth in sewage irrigated soils. Data further indicate enrichment of heavy metals due to the discharge of sewage water and sludge mostly in the surface layer with very little mobility the profiles. Amaranthus commonly grown in the sewage irrigated area, in all treatment the Amaranthus contained considerably highest level for both metals as compared to underground vegetables and least in overground vegetables.

REFERENCES

1. Aktauzzaman, M., Fukhruddin, A. N. M., Chowdhry, M.A., Fardous, Z. and Alum, M. K., 2013. Accumulation of Heavy Metals in Soil and their Transfer to Leafy Vegetables in the Region of Dhaka Aricha Highway, Savar, Bangladesd. Pakistan Journal of Biological Science, 16(7): 332-338.
2. Alghobar, M.A. and Suresha, S., 2017. Evaluation of metal accumulation in soil and tomatoes irrigated with sewage water from Mysore city, Karnataka, India. J. Saudi Soc. Agric. Sci. 16, 49–59.
3. Arora, M., Kiran, B., Rani, S., Rain, A., Kaur, B. and Mittal, N., 2008. Heavy metal accumulation in vegetables irrigated with water from different sources. Food Chem. 111, 811–815.
4. Balkhair, K.S., Ashraf, M.A., 2016. Field accumulation risks of heavy metals in soil and vegetable crop irrigated with sewage water in western region of Saudi Arabia. Saudi J. Biol. Sci. 23, S32–S44.
5. Chauhan, G., Chauhan, U.K., 2014. Human health risk assessment of heavy metals via dietary intake of vegetables grown in wastewater irrigated area of Rewa, India. Int. J. Sci. Res. Publ. 4, 9.
6. Chitdeshwari T, Savithri P, Mahimai Raja S (2002). Effect of sewage bio-solids compost on biomass yield of Amaranths and heavy metal availability. J. Indian Soc. Soil Sci. 50:480-484.
7. Chopra, S.L. and Kanwar, J.S., 1999. Analytical Agricultural Chemistry, Kalyani Publication, New Delhi.
8. Dogheim, S. M., Ashraf, El.M.M., Alla, S.A.G., Khorship, M.A. and Fahmy, S.M., (2004). Pesticidies and heavy metal levels in Egyption leafy vegetables and some aromatic medicinal plants. Food Additives and contaminations, 21, 323-330.
9. Dunbar K.R., McLaughlin, M.J. and Reid, R.J. The uptake and partitioning of cadmium in two cultivars of potato (Solanum tuberosum L.) J. Exp. Bot. 2003; 54:349–354.
10. Ekong E.B., Jaar B.G. and Weaver, V.M. Lead-related nephrotoxicity: A review of the epidemiologic evidence. Kidney Int. 2006; 70:2074–2084.
11. Goyer R.A. Lead Toxicity: Current Concerns. Environ. Health Persp. 1993; 100:177–187.
12. Hamid, A., Raza, H., Akhtar, S. and Ahmad, S. R., 2016. Heavy Metal Contamination in Vegetables, Soil and Water and Potential Health Risk Assessment. American- Eurasian J. Agric. & Environ. Sci., 16 (4): 786-786.
13. Iyengar, V., Nair, P., 2000. Global outlook on nutrition and the environment: meeting the challenges of the next millennium. Sci. Total Environ. 249, 331–346.
14. Jaishankar, M., Tseten, T., Anbalagan, N., Mathew, B.B. and Beeregowda, K.N., 2014. Toxicity, mechanism and health effects of some heavy metals. Interdiscip Toxicol. 7 (2), 60–72.
15. Khan, S., Cao, Q., Zheng, Y.M., Huang, Y.Z. and Zhu, Y.G., 2008. Health risk of heavy metals in contaminated soils and food crops irrigated with waste water in Beijing, China. Environ. Pollut. 152 (3), 686–692.
16. Klaassen C.D., Liu J. and Choudhuri S. Metallothionein: An intracellular protein to protect against cadmium toxicity. Annu. Rev. Pharmacol. 1999;39:267–294.
17. Klaassen C.D., Liu J. and Diwan B.A. Metallothionein protection of cadmium toxicity. Toxicol. Appl.Pharm. 2009; 238:215–220.
18. Kumar, C. and Mani, D., 2010. Enrichment and management of heavy metals in sewage irrigated soil.Lap LAMBERT Acad. Publishing, Dudweiler

(Germany).

19. Li, F., Jhang, C., Qu, Y., Chen, J., Chen, L., Liu, Y. and Zhou, Q. 2010. Quantitative characterization of short- and long-chain perfluorinated acids in solid matrices in Shanghai, China. Sci. Total Environ. 408:617-623.
20. Liu, W.H., Zhao, J.Z., Ouyang, Z.Y., Soderlund, L. and Liu, G.H., 2005. Impacts of sewage irrigation on heavy metals distribution and contamination in Beijing, China. Environ. Int. 31, 805–812.
21. Lone, A. H., Lal, E. P., Thakur, S., Ganie, S.A., Wani and F. A., 2013. Accumulation of heavy metals on soil and vegetable crops grown on sewage and tube well water irrigation, Sci. Res. Essays, 8(44) : 2187-2193.
22. Marshall, 2004. Enhancing food chain integrity: quality assurance mechanism for air pollution impacts on fruits and vegetables systems. Crop Post Harvest Program, Final Technical Report (R7530).
23. Motulsky, H. J. and Christopoulos, A., 2003.Graph Pad Software Inc, San Diego CA.
24. Navas-Acien A., Guallar E., Silbergeld E.K. and Rothenberg S.J. Lead exposure and cardiovascular disease: A systematic review. Environ. Health Perspect. 2007; 115:472–482.
25. Patrick L. Toxic metals and antioxidants: Part II. The role of antioxidants in arsenic and cadmium toxicity. Altern. Med. Rev. 2003; 8:106–128.
26. Radwan, M.A. and Salama, A.K., 2006. Market basket survey for some heavy metals in Egyptian fruits and vegetables. Food Chem. Toxicol. 44 (8), 1273–1278.
27. Rahman, M.A., Rahman, M.M., Reichman, S.M., Lim, R.P. and Naidu, R., 2014. Heavy metals in Australian grown and imported rice and vegetables on sale in Australia: Health hazard. Ecotoxicol. Environ. Saf. 100, 53–60.
28. Ramteke, S., Bharat, B. L., Dahariya, N. S. and Patel, K. S., 2016. Heavy metal contamination of vegetables. Journal of Environmental Protection, 7: 996-1004.
29. Shuaibu, I. K., Yahaya, M. and Abdullahi, U. K., 2013. Heavy metal levels in selected green leafy vegetables obtained from Katsina central market, Katsna, North-western Nigeria. African Journal of Pure and Applied Chemistry, 7(5): 179-183.
30. Sharma, R.K., Agrawal, M. and Marshall, F., (2007). Heavy metal contamination of soil and vegetables grown in waste water irrigated areas of Varanasi, India: Ecotoxicology and Environmental Safety, 66,258-266.
31. Türkdog˘an, M.K., Kilicel, F., Kara, K., Tuncer, I. and Uygan, I., 2003. Heavy metals in soil, vegetables and fruits in the endemic upper gastrointestinal cancer region of Turkey. Environ. Toxicol. Pharmacol. 13, 175–179.
32. Wu et al., 2018, W. Wu, P. Wu, F. Yang, D. Sun, D. Zhang, Zhou Yi Assessment of heavy metal pollution and human health risks in urban soils around an electronics manufacturing facility Sci. Total Environ., 630 (2018), pp. 53-61.
33. Yang J., Guo H., Ma Y., Wang L., Wei D. and Hua L. Genotypic variations in the accumulation of Cd exhibited by different vegetables. J. Environ. Sci. China. 2010; 22:1246–1252.
34. Yang Y., Zhang F.S., Li H.F. and Jiang R.F. Accumulation of cadmium in the edible parts of six vegetable species grown in Cd-contaminated soils. J. Environ. Manag. 2009; 90:1117–1122.

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FOOD AND FEEDING HABITS OF THE BULL'S EYE (PRIACANTHUS HAMRUR) LANDED ALONG THE VERAVAL COAST OF SAURASHTRA REGION, GUJARAT

D.N. Jungi* and A.J. Bhatt*

*Department of Fisheries Resource Management

College of Fisheries, Junagadh Agricultural University, Veraval – 362 265

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ABSTRACT

The present study on food and feeding habits of Bull's eye (Priacanthus hamrur) was carried out along Veraval coast of Saurashtra. The study was conducted from August 2017 to July 2018. For determining the food and feeding habits of P. hamrur in the Veraval coast, a total of 448 samples of P. hamrurwere randomly collected from the commercial fisherman during the study period. Results from the stomach contents analysed using frequency of occurrence methods showed that Acetus spp., S. Crassicornis, Loligo spp., Apogon spp., and Bregmaceros spp., were the most dominated food items in the gut of P. hamrur. The feeding intensity was higher in mature fishes. The GaSI values were worked out for different months. The highest value was noticed during the month of November followed by October.

Keywords : Bull's eye, priacanthus hamrur; food and feeding; veraval coast.

INTRODUCTION

The fishes of the family Priacanthidae (Order: Perciformes), which are popularly called bull's "big eye" or "bull's eye" are generally red in colour varying from pink silver through molt red to solid red with very large eyes(Anjanayappaet al,. 2007).Priacanthids, being a deep water resources, occur at depth ranges of 200-500 m during most part of the year but the maximum abundance has been reported in the 100 to 200 meter depth zone off the west coast (Bande et al., 1990).Their habitat characterized by comparatively low sea water temperature, high salinity and low dissolved oxygen concentrations (Philip, 1994).Priacanthus hamrur is a highly carnivore and it's a column feeder, feeds almost exclusively on crustaceans as revealed by qualitative and quantitative analyses of gut contents. Food is one of the important factors regulating or influencing thegrowth, fecundity, migration and abundance of fish stocks. Seasonal anddiurnal abundance of favourite food organisms may be responsible for

thehorizontal and vertical movements of the fish stocks(Pillai et al., 1996).A knowledge on the food and feeding habits is essential for theprediction of abundance and exploitation of stocks. By identifying the favourable food and feeding habits of commercially important fishes, appropriate fishing strategies and techniques can be designed.

The gut content of P. hamrur studied by Philip (1994, 1998) from upper east coast of India and concluded that P. hamrur is a carnivore feeding mainly on crustaceans, teleost fishes and occasionally other food organisms like cephalopods, polychaetes, gastropods. Among these, crustaceans formed more than 60% of the identifiable food items. Rao (1984) made a qualitative analysis of stomach contents of P. macracanthus from Bay of Bengal and found that the species fed mainly on crustaceans and teleosts. Among these two, crustaceans were dominant and comprised of Penaeus spp., Metapenaeus spp., and Solenocera spp., The feeding intensity was low during November to December. While studying food and feeding of P. hamrur from south west coast of India, Premalatha (1997) obseved that this fish was a highly carnivore and there was no preferential feeding. Anchovies, small crustaceans and parts of cephalopods were the commonly found food items. Some of the earlier works on the feeding habits of Priacathidae are by Lester (1968) on biology of P.tayenus, Tamura (1959) on Priacanthids, Shivakami et al., (2001) on food and feeding habits of P. hamruralong Indian coast and Mandy and Inasu (2003) on food and feeding habits of P. hamrur.

MATERIALS AND METHODS

The present study was carried out along the Veraval coast (Lat. N 20°34'613" and Long. E70°12'340"), situated along the western coast of Gujarat, India (Fig. 1). Which is the most productive part of the Saurashtra coast especially for the trawl fishing sector of Gujarat.For food and feeding study, A total of 446 stomach contents were dissected, weighed, opened and contents analysed by qualitative and quantitative methods.The feeding intensity was assessed based on the distension of their stomach and the volume of food contained in it and was classified as full, ¾ full, ½ full, ¼ full, trace and empty.The relative importance of various food items in the stomach was determined by calculating the Index of Relative Importance (Pinkas et al., 1971).The IRI was computed as given below: IRI = (%N + %V) x %F; Where, N = number, V = volume and F = frequency of occurrence. Gastro somatic index was calculated as

G.S.I. = (Weight of gut / weight of fish) X 100

Fig.-1. Map showing the location of Veraval fish landing centre, Gujarat, India.

RESULTS AND DISCUSSION

During the present investigation, a total of 446 stomachs of P. hamrur ranging from 140 to 345 mm total length (TL) were examined during the study period. Most of the examined specimens were found with half and three fourth stomach contents. There was very less number empty stomachs observed. As the guts were examined based on the month, the results revealed that the presence of half (35.59%) and three fourth (28.33%) stomachs were the highest in January and September respectively. The percentage of empty

stomachs were the highest (17.86%) in August and the lowest (1.67%) in September. Stomachs with one fourth and full contents were very low in all the month except in February where stomach with one fourth contents was (33.33%) and in November where stomach with full contents was (27.12%; Table 1).

Table-1. Monthly average (%) feeding intensity of P. hamrur during 2017-18.

Month	Percentage of gut status in different months					
	Empty	Trace	Quarter	Half	Three fourth	Full
Aug-17	17.86	-	28.57	28.57	7.14	17.86
Sep-17	1.67	6.67	15.00	23.33	28.33	25.00
Oct-17	5.00	13.33	16.67	13.33	33.33	18.33
Nov-17	3.39	3.39	16.95	22.03	27.12	27.12
Dec-17	13.33	3.33	23.33	25.00	25.00	10.00
Jan-18	10.17	5.08	18.64	35.59	18.64	11.86
Feb-18	15.00	8.33	33.33	25.00	15.00	3.33
Mar-18	10.00	3.33	11.67	25.00	28.33	21.67

The stomach contents of P. hamrur mainly consist of crustaceans, fishes, cephalopod and crabs along with semi digested materials. Crustaceans were dominated food items present in the gut where shrimps i.e., Acetes spp., Solenocera spp., Penaeus spp., and Parapenaeopsis spp., and followed by Fishes and Cephalopods. Fishes comprised of Bregmaceros spp., and Apogon spp.,was dominated. Molluscs was represented by Loligo spp.,and cuttlefish was represented by Sepia spp., among the food items. Some other species viz., crabs, parasite was also occurred in the stomach content. Kizhakudan and Zala, (1999) revealed P. hamrur to be a carnivorous fish with a preference for pelagic crustaceans and fishes.

The most frequent food items observed in the diet of P. hamrur was Shrimp, fish, and Cephalopods, which were encountered in almost all the months. As dietary components, Acetes spp., and Solenocera spp., were more frequent food items in all the months. Loligo spp., was a frequent food item in all the months except November. Apogon spp., was present in stomachs all the months except August, September, October and December. Whereas a content of crab spp. was absent in August, September and November. During January, February and March, some new food itmes i.e., S. Pharonis, H. Nehereus, Parapenaeopsis spp., Otolithes spp., Decapterus spp., appeared in the stomach contents (Fig. 2).

The variation in Index of Relative Importance (IRI) percentage of food items ingested by P. hamrur during different months revealed that the percentage composition of different food items varied in different months according to their availability and preference. Analysis of the IRI of P. hamrur showed that Acetes spp., and Solenocera spp., formed the major food items. Fishes, Cephelopods, Crabs and semi digested material occurred in considerable quantity. It also fed Apogon spp., Bragmacerosspp., Lutjanas spp., Saurida spp., and Nemipterus spp. (Table 2; Fig. 3).

Table-2. Monthly variations of IRI in the dietary components of P. hamrur.

Food Prey Item	IRI							
	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
Acetes spp.	85.662	98.537	91.254	90.724	83.690	73.617	65.950	79.115
Loligo spp.	1.328	0.045	0.052	-	0.239	0.226	1.642	0.187
N. hexodon	0.118	0.014	-	-	-	-	-	-
Lutjanas spp.	0.024	-	-	-	-	-	-	-
S. Crassicornis	7.394	0.068	5.703	0.036	13.015	13.796	9.680	16.111
Nemipterus spp.	-	0.017	-	-	-	-	-	-
Apogon spp.	-	-	-	6.534	-	0.045	0.716	0.232
N. japonics	-	-	-	0.173	-	-	-	-
S. tumbil	-	-	0.036	0.176	-	-	-	0.074
Chirocentrus spp.	-	-	-	0.043	-	-	-	-
P. semisulcatus	-	-	-	0.0003	-	-	-	-
L. savala	-	-	1.864	-	0.191	-	-	0.592
Bregmaceros spp.	-	-	0.135	-	0.521	0.003	-	0.859
P. stylifera	-	-	-	-	0.063	-	-	-
Cynoglossus spp.	-	-	0.054	-	0.018	0.057	0.004	0.014
S. pharonis	-	-	-	-	-	0.028	0.143	0.527
H. nehereus	-	-	-	-	-	0.001	-	-
Parapenaeopsis spp.	-	-	-	-	-	0.004	2.184	0.011
Otolithes spp.	-	-	-	-	-	-	0.004	0.048
Decapterus spp.	-	-	-	-	-	-	0.099	-
Digested material	5.474	1.041	0.833	2.315	2.258	4.647	10.770	1.842
Shrimp Spp.	-	0.278	0.009	-	-	7.510	8.759	-
Crab spp.	-	-	0.060	-	0.005	0.065	0.048	0.387

Table-3. Monthly variations in GaSI of *P. hamrur*

Month	GaSI (Gastrosomatic Index)
Aug-17	2.155
Sep-17	2.597
Oct-17	3.328
Nov-17	3.374
Dec-17	2.854
Jan-18	3.087
Feb-18	2.703
Mar-18	3.185

Gastro-somatic Index

The gastro-somatic index values were worked out for different months. It could be seen that the gastro-somatic index showed high values during October and November. The highest value was noticed during the month of November (3.37) followed by October (3.32). The lowest value of 2.15 was noticed in the month of August. September also showed very low values (Table 3; Fig. 4). The values of the feeding index did not show any significant variation in different months. However, the feeding intensity was slightly higher during the period of September to December (Thangavelu et al., 2012).

In the present investigation, we apparent that the P. hamrur is a carnivore and

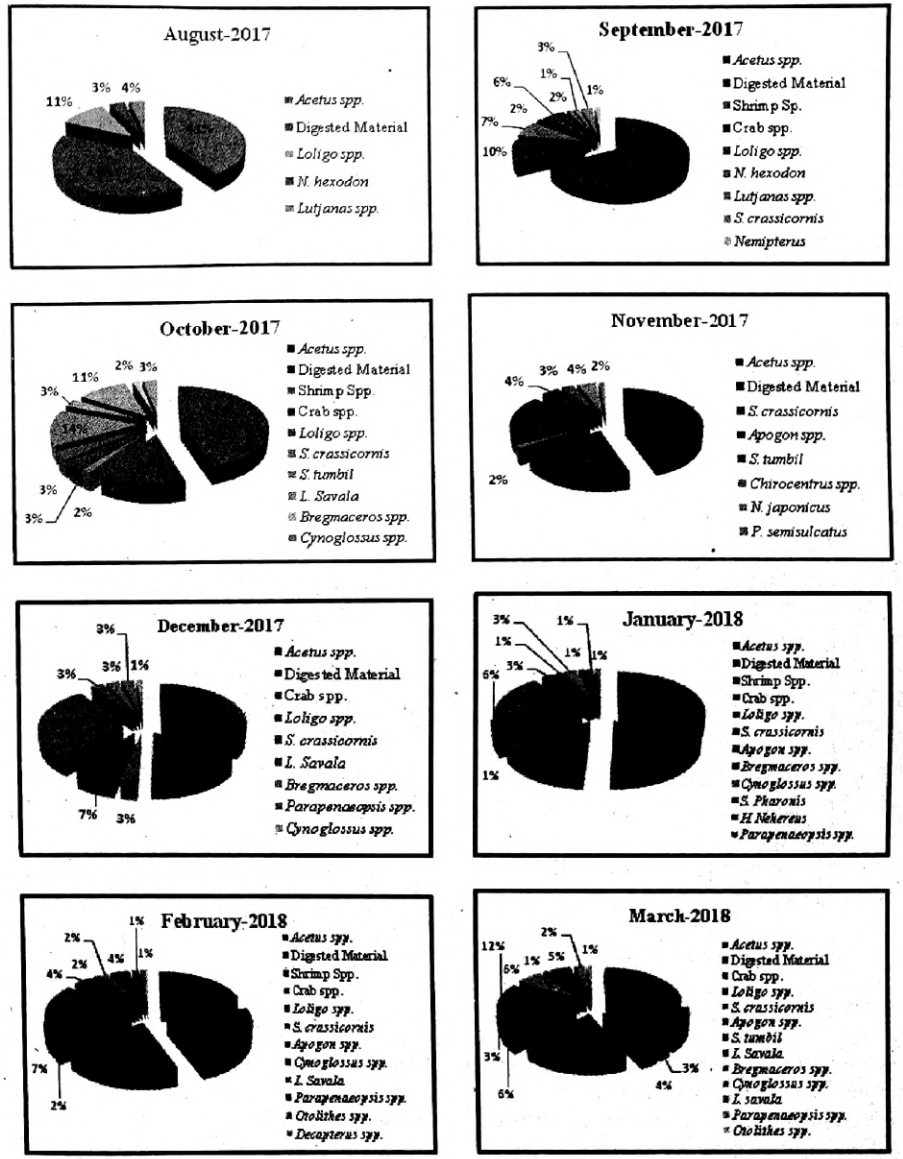


Fig.-2. Monthly average (%) compositions of various food items of *P. hamrur* during the 2017-2018

Fig.-3. Monthly variations of IRI in the dietary components of *P. hamrur*.

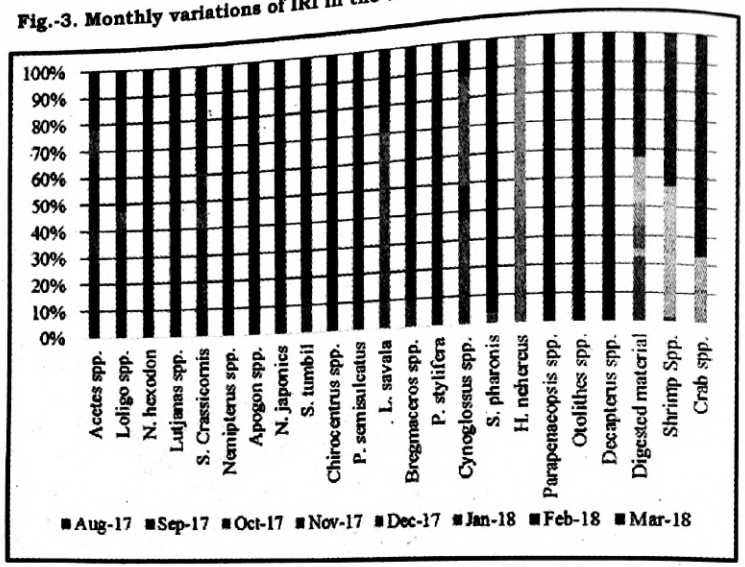
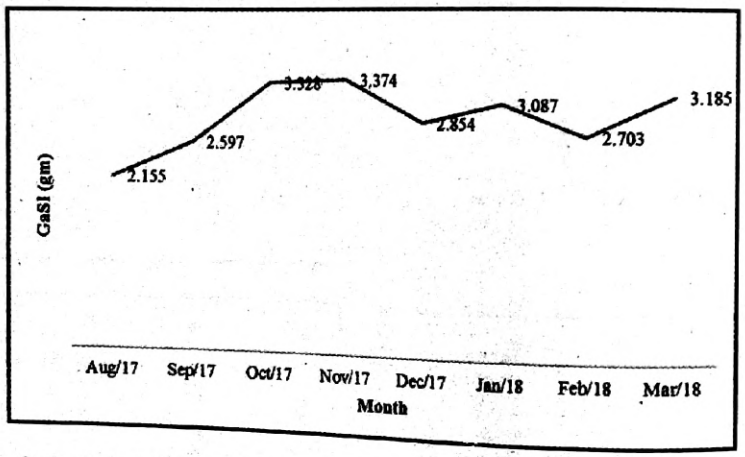


Fig.-4. Monthly variation in the Gastrosomatic Index (GaSI) of *P. hamrur*.



mainly feed on benthic and epibenthic organisms such as fishes, shrimps, crabs and squids (Table 2). The deep sea shrimps are one of the major diet components ofP. hamrur, which is also an indication of the availability of good quantity of deep sea shrimps along the South-eastern Arabian Sea.

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REFERENCES

1. Anjanayappa, H. N. 2007. Studies on the fishery, biology and Population dynamics of Priacanthus hamrur (forsskal) off Mangalore coast. M.F.Sc. thesis, Karnataka Veterinary, Animal and Fisheries Sciences University, India.
2. Bande, V. N.; Menon, N. G. and Balachandran, K. 1990. Studies on the distribution and abundance of Bulls eye (Priacanthus spp) in the EEZ of India. In: Mathew, K. J (Ed.) Proc. First Workshop Scient. Result. FORV Sagar Sampada. CMFRI, Cochin. 233-238.
3. Kizhakudan, S.J. and Zala, M.S. 2006. Dynamics of Priacanthus hamrur (Forsskal) exploited off Saurashtra coast. Indian Journal of Fisheries. 53(4): 409-416.
4. Lester, R.J. G. 1968. Feeding of Priacanthus tayenus and P. macracanthus near Hong Kong. Publications of the Seto Marine Biological Laboratory. 16(1): 1-6.
5. Mandy, T. J. and Inasu, N. D. 2003. Food and feeding habits of the Bullseye, Priacanthus hamrur (Forsskal) off Kerala. Journal of marine biological. Association of India. 45(2): 224-231
6. Philip, K. P. 1998. Food and feeding habits of Priacanthus hamrur (Forsskal) from the upper east coast of India. Tech Bull, 26.12-25. Fisheries Survey of India, Visakhapatnam.
7. Philip, K.P. and Kuruvila, M. 1994. Studies on the biology and fishery of the fishes of the family Priacanthidae (Pisces: Perciformes) of Indian waters. Ph.D. thesis, Cochin University of Science and Technology, India. 169.
8. Pillai, N. V. 1996. Presence of upwelled water in shelf region along the central east coast of India towards the end of summer monsoon and its possible effect on the migration of bullseye in to the shallow areas of the shelf. In: The Fourth Indian Fisheries Forum, Proceedings, November 24-28, 1996, Cochin University of Science and Technology, Kochi, Kerala.
9. Pinkas and Iverson, I.L.K., 1971. Food habits of albacore, bluefin tuna and bonito in Californian waters. California Department of Fish and Game: Fish Bulletin.152:1-105.
10. Premalatha, P. 1997. On the fishery and biology of Priacanthus hamrur Forsskal along the Southwest coast of India. Indian Journal of Fisheries. 44(3): 265-270.
11. Rao, T. A. 1984. On some aspects of biology of Priacnthus macracanthus, Indian J. Fish. 31(3): 380-382.
12. Sivakami, S.; Raje, S. G., Khan, M. F., Sobha, J. K., Vivekanandan, E. and Raj Kumar. 2001. Fishery and biology of Priacanthus hamrur (Forskal) along the Indian coast. Indian Journal of Fisheries. 48(3): 277-289.
13. Tamura, T. 1959. Fundamental studies on the visual sense in fish. In:Modern fishing gear of the world.H. Kristjonsson,(ed.)Fishing News Books, London. 543-547.
14. Thangavelu, R.; Anbarasu, M.; Zala, M. S. Koya, M. Sreenath, K. R..; Mojjada, S.K. and Shiju, P. 2012. Food and feeding habits of commercially important demersal finfishes off Veraval coast. Indian Journal of Fisheries. 59(4): 77-87.

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STUDIES ON THE NUTRITIVE VALUE OF DIFFERENT VEGETABLE REFUSES

Kamlesh Singh
Department of Animal Husbandry and Dairying,
KAPG College, Allahabad-211001, (U.P.), India

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ABSTRACT

Present study provided information about the useful utilization of vegetable wastes. Vegetable wastes are rich source of nutrients and these can be fed either as such, after drying or ensiling with cereal straws, without affecting the palatability, nutrient utilization, health or performance of livestock. The effective and efficient utilization of vegetable wastes will reduce the cost of animal feeding thereby increasing farmer's profit. On chemical analysis, it was observed that except turnip (skin and leaves) all the vegetable refuses analyzed here contained a fairly good amount of crude protein. The cellulose and lignin contents of bottle-gourd leaves were found to be high.

Keywords : Nutritive, vegetable, cellulose, lignin.

INTRODUCTION

India is a heavily populated country and this is the only reason for enormous waste being produced regularly out of household and industrial activities. In our country, various types of vegetable refuses are available and have a high moisture content of 80-89%, and create pollution problem which vary according to the feed habits of a particular locality. These refuses are mainly available as by products in markets, big hotels, hospitals and hostels which may be used as good animal feed. But the data on composition of different vegetable refuses are scanty(Gupta et. al., 1985; Thakur and Bhatia, 1985). So prior to feeding it is necessary to have a complete knowledge about the chemical composition of these by-products. He object of the present investigation is, therefore to determine the nutritive values of various vegetable refuses as available in U.P. by Van Soest method of analysis.

MATERIALS AND METHODS

Vegetable wastes have been collected from local market and regular household activities like peeling and cutting prior to cooking. These wastes included peels and wastes portions of vegetable. They have been subjected to sun drying for 4-5 days followed by grinding to form fine powdered wastes and passed through standard size reduction equipment for a particular particle size and finally stored in containers for use and analysis. Dry matter, total ash and crude protein of the sa,ples were determined as per usual Weende method of proximate analysis (AOAC, 1980) . Neutral detergent fibre (NDF) , Cellulose, hemicellulose and lignin were determined as per Van Soest method of chemical analysis (1967) . Statistical analysis was done as per Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The average results (four samples of each) are presented in the table-1. Among the winter vegetables, radish, cabbage, cauliflower, bottle ground(skin and leaves) , ash ground,empty rod of peas and turnips(skin and leaves) were studied. Out of these cabbage (Barassica oleracea var. capitata) contained about 20 25% crude protein but gupta et al., (1985) studied the chemical composition of cabbage and found it to contain 27.04% crude protein. Its hemicellulose and cellulose percentages were 7.01% and 9.50% but lignin content was low. Total ash content was high(about 15%) . Cauliflower(Brassica okracea) contained about 19.31% crude protein. Hemicellulose and cellulose percentaged were 7.02% and 9.06% respectively and lignin content was 6.09% ansd total ash content was 8.6% only. Radish (Raphanus sativum) has got a peculiar smell for which it is not generally relished by animals and its leaves are also repellant. However its crude protein content was about 14.87% which agrees fairly well with observation (15.32%) by Thakur and Bhatia (1985). Cellulose content was high(13.06%) which concurs with the results (15-16%) of Thakur and Bhatia (loc. cit.).Lignin and hemicellulose content of radish as obtained in the present study was 6.06% and 8.02% respectively as against 2.03% and 1.16% respectively as reported by Thakur and Bhatia (loc. cit.). Probably they used young radish leaves for analysis. Total ash content was 4.09% only.

Crude protein content of skin and leaves of bottle ground (Lageneria sicerria) was more or less the same i.e. 17.5% in the skin and 16.68% in the leaves. Hemicellulose content differed. Leaves contained 15.01% against skin with contained 9.01%. Again cellulose content in leaves was 91.06% whereas its skin contained only 18.06%. Similarly lignin content in leaves was as high as 76.09% and skin had only 8.02%. Leaves contained higher amount of total ash- 6.40% whereas skin contained only 1.20%. Both leaves and skin were readily eaten by cattle.

The protein content of skin of ash gourd (Benincosa hispida) was more or less the same as that of bottle gourd 16.62% . Cellulose content was also the same 18-21% but hemicellulose content varied. Ash gourd skin contained about 28% hemicellulose whereas skin of bottle gourd contained 9.01% hemicellulose. Lignin content in skin of ash gourd was 11.06% as against 8.02% of bottle gourd. striking difference where's noticed in respect of mineral contents total as in the skin office garden bottle gourd the former showing a value of 8.09% as against 1.2% only in case of later. Likewise, wide difference was noticed in silica concentration. Ash gourd contained 1.30%, silica vis-a-vis 0.7% silica content in bottle gourd.

Empty pod of pea contained good amount of crude protein about 17.06% which was similar to the observation made by Gupta et al., (1985). (16.11% crude protein), its hemicellulose content was 8.01% but cellulose content was high (13.02%). Presence of lignin was also low; mineral was 7.21%.

Difference was noticed in crude protein content of the skin and leaves of turnip

Table-1. Nutritive value of different vegetables

Common Name	Botanical name	Dry Matter	Crude protein	NDF	ADF	Hemicellulose	Cellulose	lignin	Total ash
[illegible]	[illegible]	12.02 ± 0.28	14.87 ±0.49	28.04 ±0.32	20.02 ±0.66	8.02 ±0.44	13.06 ±0.32	6.06 ±0.36	4.90 ±0.12
Cabbage	Brassica oleracea var Capitata	30.06 ±0.86	20.25 ±0.42	22.04 ±0.82	15.02 ±0.36	7.01 ±0.48	9.50 ±0.06	4.50 ±0.52	15.00 ±0.63
[illegible]	[illegible]	[illegible] ±0.28	[illegible] ±0.38	[illegible] ±0.68	[illegible] ±0.62	[illegible] ±0.36	[illegible] ±0.82	6.09 ±0.08	8.60 ±0.86
Bottleground (leaves)	Lagenaria siceraria	12.06 ±0.64	16.68 ±0.52	35.04 ±0.48	20.03 ±0.21	15.01 ±0.82	91.06 ±0.58	76.09 ±0.79	6.40 ±0.33
[illegible]	[illegible]	[illegible] ±0.66	[illegible] ±0.68	[illegible] ±0.86	[illegible] ±0.32	[illegible] ±0.68	[illegible] ±0.38	11.06 ±0.84	8.09 ±0.38
Empty pea pod	Pisum sativum	15.08 ±0.66	17,06 ±0.72	28.06 ±0.58	20.05 ±0.82	8.01 ±0.09	13.02 ±0.62	5.06 ±0.08	7.21 ±0.60
[illegible]	[illegible]	[illegible] ±0.84	[illegible] ±0.36	[illegible] ±0.42	[illegible] ±0.66	[illegible] ±0.82	[illegible] ±0.36	[illegible] ±0.26	[illegible] ±0.08
Turnip (skin)	Brassica cauloropa	10.40 ±0.92	3.81 ±0.28	28.06 ±0.36	[illegible]	3.04 ±0.42	23.02 ±0.60	8.06 ±0.60	3.90 ±0.12
[illegible]	[illegible]	[illegible] ±0.66	[illegible] ±0.06	[illegible] ±0.92	[illegible] ±0.56	[illegible] ±0.06	[illegible] ±0.80	[illegible] ±0.03	[illegible] ±0.22

Brassica cauloropa. Skin contained about 3.8% crude protein and the leaves had 5.46% crude protein. Hemicellulose content was the same (about 3%) but wide difference was noticed in respect of cellulose contcent. Skin had 23.02% cellulose whereas leaves contained 11.06%. Lignin content also varied; the skin had 8.06% lignin while that in leaves

was only 5.05%. Total ash contents were more or less the same.

REFERENCES

1. AOAC (1980) :Official methods of Analysis (13th ed). Association of Official Agricultural Chemists. Washington, D.C.
2. Gautam, H. R. and Guleria, S.P.S. (2007): Fruit and vegetable waste utilization. Sciene Tech. Enterpreneur. 32:38.
3. Gupta, B.S., Ranjan, S.K. Maheswari, P.K. and Sinha, A.P.(1985): Indian J. Anim. Health., 24:26.
4. Snedecor and Cocharan. W.G. (1967): Statistical Methods. 6th Edn. Oxford and IBH Pudlishing Co., New Delhi,
5. Thakur. S.S. and Bhatia. D.R, (1985): Indian J. Anim. Health., 24 : 85.
6. Van Soest, PG. (1967), : J. Anim. Sci. 26:119.
7. Wadhwa, M and Bakshi, M.P.S. (2005) : Vegetable wastes- A potential source of nutrients for ruminants. Indian journal of animal nutrition, 22:70-76.
8. Wadhwa, M ; Kaushal, S. and Bakshi, M.P.S. (2006) : Nutritive evaluation of vegetable waste as complete feed for goat bucks. Small Ruminant research, 64:279-84.

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CHECKLIST OF AVIAN FAUNAL DIVERSITY AT ORDNANCE FACTORY KHAMARIA (OFK) ESTATE, JABALPUR, M.P.

Rita Bhandari[1], Shivam Dubey[2], K K Dube[3] and Jaishree Sharma[4]

[1] Government OFK College, Jabalpur Madhya Pradesh, India

[2, 3] and [4] Government Science College, Jabalpur Madhya Pradesh, India

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ABSTRACT

The current study is based on the data and sighting observations taken in the Ordnance Factory Khamaria (OFK) estate present in the Jabalpur district of Madhya Pradesh, India. The area under observation contained many residential colonies, wetlands, agricultural fields and forest area. The area is also surrounded by the villages. The OFK is famous for the manufacturing of explosives which are supplied to the Indian Army hence the area which is studied here is a restricted one in terms of human interferences. The area holds the promise to provide niche to various residents as well as migratory birds due to the presence of dense forest cover. Many species of mammals, reptiles and amphibians are found here. In the present study, the bird diversity includes 72 species belonging to 30 families.

Keywords : OFK, khamaria, Jabalpur, birds, diversity.

INTRODUCTION

The Ordnance Factory Khamaria is situated in Jabalpur district of Madhya Pradesh. It is one of the premier defense establishments known for its production of explosives which in turn are supplied to the different units of the Indian Armed Forces. The whole estate is divided into two major parts – East Land and West Land covering an area of approximately 1200 hac. The major part of the estate is covered with forest or shrubby vegetation. In between few wetlands and plains are also present. During rainy season number of small temporary ponds are formed which in turn attracts many avian species to the area. The region has many residential quarter complexes, a hospital and a degree college. A broad account of avian diversity in the state of Madhya Pradesh and Chhattisgarh was presented by Chandra and Singh (2004). They reported 517 species belonging to 69 families from the areas. Similarly records of birds from Central Highlands of Madhya Pradesh were reported by Jayapal et al. (2005). The present paper presents an account of 72 species of birds belonging to 30 families.

MATERIALS AND METHODS

In present study the data is collected by regular field visits to the area during early morning and in the evening as at these times the birds are found to be most active. Filed visits were also carried out during the daytime to study the activity of the birds. Few night visits were also carried out in order to spot any nocturnal bird. After spotting the bird, their main visible characters were noted and are matched with the literature available. The pictures of the birds were also taken and their other habits such as feeding, calls etc were also noted down for correct identification. Many times, the birds were also identified based on their calls, silhouettes and other features.

RESULTS AND DISCUSSION

The compiled list of the 72-species found in the area is as follows-

Table-1. List of avian species recorded in OFK Estate, Jabalpur

S. No.	Family	Common Name	Scientific Name	IUCN Status	Abundance	Local Status
1	Phasianidae	Painted Francolin	*Francolinus pictus*	LC	UC	R
2		Grey Francolin	*Francolinus pondicerianus*	LC	C	R
3		Red Junglefowl	*Gallus gallus*	LC	C	R
4		Indian Peafowl	*Pavo cristatus*	LC	C	R
5	Turnicidae	Barred Buttonquail	*Turnix suscitator*	LC	FC	R
6	Anatidae	Lesser Whistling Duck	*Dendrocygna javanica*	LC	C	R
7		Knob-billed Duck	*Sarkidiornis melanotos*	LC	C	R
8		Indian Spot-billed Duck	*Anas poecilorhyncha*	LC	C	R
9		Common Teal	*Anas crecca*	LC	C	WM
10	Ardeidae	Yellow Bittern	*Ixobrychus sinensis*	LC	FC	R
11		Indian Pond Heron	*Ardeola grayii*	LC	C	R
12		Purple Heron	*Ardea purpurea*	LC	UC	R
13		Cattle Egret	*Bubulcus ibis*	LC	C	R
14		Intermediate Egret	*Mesophoyx intermedia*	LC	C	R
15		Little Egret	*Egretta garzetta*	LC	C	R
16	Threskiornithidae	Black-headed Ibis	*Threskiornis melanocephalus*	NT	C	WM
17	Phalacrocoracidae	Little Cormorant	*Phalacrocorax niger*	LC	C	R
18	Accipitridae	Black-winged Kite	*Elanus caeruleus*	LC	C	R
19		Black Kite	*Milvus migrans*	LC	C	R
20		Oriental Honey Buzzard	*Pernis ptilorhynchus*	LC	C	R
21		Indian Vulture	*Gyps indicus*	CR	UC	R
22		Shikra	*Accipiter badius*	LC	C	R
23		Tawny Eagle	*Aquila rapax*	LC	UC	R

S. No.	Family	Common Name	Scientific Name	IUCN Status	Abundance	Local Status
24	Rallidae	Purple Swamphen	*Porphyrio porphyrio*	LC	C	R
25		Common Moorhen	*Gallinula chloropus*	LC	C	R
26	Jacanidae	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	LC	FC	R
27		Bronze-winged Jacana	*Metopidius indicus*	LC	C	R
28	Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	LC	C	R
29	Scolopacidae	Spotted Redshank	*Tringa erythropus*	LC	FC	WM
30		Common Redshank	*Tringa totanus*	LC	C	WM
31		Wood Sandpiper	*Tringa glareola*	LC	C	WM
32		Common Sandpiper	*Actitis hypoleucos*	LC	C	WM
33	Columbidae	Rock Pigeon	*Columba livia*	LC	C	R
34		Oriental Turtle Dove	*Streptopelia orientalis*	LC	FC	WM
35		Eurasian Collared Dove	*Streptopelia decaocto*	LC	FC	R
36		Spotted Dove	*Stigmatopelia chinensis*	LC	C	R
37		Laughing Dove	*Stigmatopelia senegalensis*	LC	C	R
38		Yellow-footed Green Pigeon	*Treron phoenicopterus*	LC	C	R
39	Psittaculadae	Rose-ringed Parakeet	*Psittacula krameri*	LC	C	R
40		Plum-headed Parakeet	*Psittacula cyanocephala*	LC	C	R
41	Cuculidae	Jacobin Cuckoo	*Clamator jacobinus*	LC	FC	SM
42		Common Hawk Cuckoo	*Hierococcyx varius*	LC	C	R
43		Indian Cuckoo	*Cuculus micropterus*	LC	FC	SM
44	Tytonidae	Barn Owl	*Tyto alba*	LC	C	R
45	Strigidae	Spotted Owlet	*Athene brama*	LC	C	R
46		Indian Scops Owl	*Otus bakkamoena*	LC	UC	R
47	Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	LC	C	R
48		Common Kingfisher	*Alcedo atthis*	LC	C	R
49		Pied Kingfisher	*Ceryle rudis*	LC	C	R
50	Meropidae	Green Bee-eater	*Merops orientalis*	LC	C	R
51	Bucerotidae	Indian Grey Hornbill	*Ocyceros birostris*	LC	C	R
52	Pittidae	Indian Pitta	*Pitta brachyura*	LC	FC	SM
53	Dicruridae	Greater Racket-tailed Drongo	*Dicrurus paradiseus*	LC	FC	R
54		Black Drongo	*Dicrurus macrocerus*	LC	C	R

Table-1. List of avian species recorded in OFK Estate, Jabalpur

S. No.	Family	Common Name	Scientific Name	IUCN Status	Abundance	Local Status
55	Corvidae	Rufous Treepie	*Dendrocitta vagabunda*	LC	C	R
56		Indian Jungle Crow	*Corvus macrorhynchos*	LC	C	R
57		House Crow	*Corvus splendens*	LC	C	R
58	Pycnonotidae	Red-vented Bulbul	*Pycnonotus cafer*	LC	C	R
59	Cisticolidae	Ashy Prinia	*Prinia socialis*	LC	C	R
60		Plain Prinia	*Prinia inornata*	LC	C	R
61	Timaliidae	Common Babbler	*Turdoides caudata*	LC	C	R
62		Jungle Babbler	*Turoides striata*	LC	C	R
63	Sturnidae	Common Myna	*Acridotheres tristis*	LC	C	R
64		Brahminy Starling	*Sturnia pagodarum*	LC	C	R
65	Muscicapidae	Oriental Magpie Robin	*Copscychus saularis*	LC	C	R
66		Pied Bushchat	*Saxicola caprata*	LC	C	R
67		Verditer Flycatcher	*Eumyias thalassinus*	LC	FC	WM
68	Passeridae	House Sparrow	*Passer domesticus*	LC	C	R
69		Chestnut-shouldered Petronia	*Gymnoris xanthocollis*	LC	C	R
70	Estrildidae	Red Avadavat	*Amandava amandava*	LC	C	R
71		Scaly-breasted Munia	*Lonchura punctulata*	LC	C	R
72	Emberizidae	Crested Bunting	*Melophus lathami*	LC	UC	R

ABBREVIATIONS

Abundance : C=Common, Fc=Fairly Common, Uc=Uncommon,R=Rare

Local Status : R=Resident, Wm=Winter Migrant, Sm=Summer Migrant

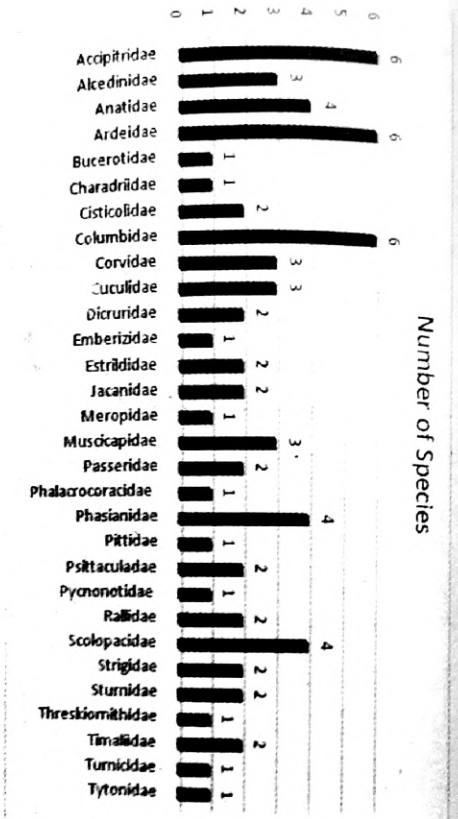
IUCN Status : Cr=Critically Endangered, En=Endangered, Vu=Vulnerable, Nt=Near Threatened

As stated earlier the diversity of avian fauna in the area comprises 72 species which shows that the area is equipped with a large variety of resources which are necessary for attracting the birds for nesting as well as feeding purposes. Maximum number of species spotted here were from the families Accipitridae, Ardeidae and Columbidae (6 each) while Bucerotidae, Charadriidae, Emberizidae, Meropidae, Phalacrocoracidae, Pittidae, Pycnonotidae, Threskiornithidae, Turnicidae and Tytonidae has the minimum number of species with one member each.

Table-2. Family wise distribution of bird species

S. No.	Family	Number of Species
1	Accipitridae	6
2	Alcedinidae	3
3	Anatidae	4
4	Ardeidae	6
5	Bucerotidae	1
6	Charadriidae	1
7	Cisticolidae	2
8	Columbidae	6
9	Corvidae	3
10	Cuculidae	3
11	Dicruridae	2
12	Emberizidae	1
13	Estrildidae	2
14	Jacanidae	2
15	Meropidae	1
16	Muscicapidae	3
17	Passeridae	2
18	Phalacrocoracidae	1
19	Phasianidae	4
20	Pittidae	1
21	Psittaculadae	2
22	Pycnonotidae	1
23	Rallidae	2
24	Scolopacidae	4
25	Strigidae	2
26	Sturnidae	2
27	Threskiornithidae	1
28	Timaliidae	2
29	Turnicidae	1
30	Tytonidae	1
Total Number of species		72

Fig.-1. Graph showing Family wise distribution of bird species



Out of the 72-species found here, 61 are residents here while 3 are summer visitors and 8 are winter visitors to the area. Common Teal, Black Headed Ibis, Spotted and Common Redshank, Wood and Common Sandpiper, Oriental Turtle Dove and Verditer Flycatcher are the winter migrants to the area for food and nesting purposes while on the other hand Jacobin Cuckoo, Indian Cuckoo and Indian Pitta are the species which migrate during the summer season.

Table-3. Showing relative abundance of the bird species

Local Abundance	Number of Species
Resident	61
Summer Migrants	3
Winter Migrants	8
Total Species	72

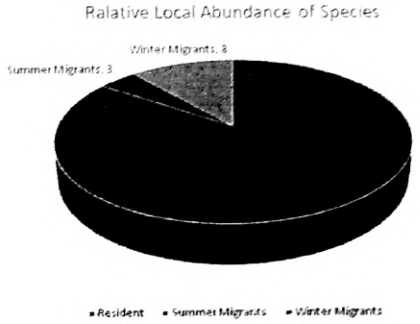


Fig.-2. Pie chart showing relative abundance of the bird species

Also, in present study, out of the total species, we also spotted a small party of Indian Vulture and a flock of Black Headed Ibis in the area. These species are listed as critically endangered and near threatened as per the IUCN Red Data list. These observations also confirm that the area holds a great potential to attract a great variety of birds.

Table-4. List of number of species as per their IUCN status

IUCN Status	Number of Species
CR	1
NT	1
LC	70
Total Species	72

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REFERENCES

1. Chandra. J. (1987). Bird ringing at Karera Great Indian Bustard Sanctuary. Zoos' Print Journal. 2(10): 5-6.
2. Chandra, K. and Singh, R.K. (2004). Avifauna of Madhya Pradesh and Chhattisgarh. Zoos'Print Journal. 19(7) : 1534 -1539.
3. Javed, S., and Kaul, R. 2002. Field Methods for Bird Surveys. Bombay Natural History Society; Department of Wildlife Sciences, Aligrah Muslim University, Aligarh and World Pheasant Association, South Asia Regional Office (SARO), New Delhi, India. 61 p.
4. Jayapal R, Qureshi Q and Chellam R (2005). Some significant records of birds from the central Indian highlands of Madhya Pradesh. Indian Birds, 1(5): 98-102.

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EFFECT OF VERMICOMPOST ON THE UPTAKE OF CADMIUM BY SPINACH

Dinesh Mani, Bechan Singh and Vipin Sahu
Sheila Dhar Institute of Soil Science, Department of Chemistry
University of Allahabad, Allahabad- 211002, (U.P.), India

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ABSTRACT

A field experiment was conducted to find out the effect of vermcompost uptake of cadmium by spinach on alluvial soil of Sheila Dhar Institute experimental farm Allahabad. Three levels of vermicompost (0, 10,and 20 t ha-1), Cd (0, 10 and 20 mg kg-1) were applied as vermicompost and CdCl2, respectively. The application of vermicompost 20 t ha-1 increased the dry biomass of spinach by 26.51 % over the control. The application of 20 mg kg-1 Cd maximum reduces dry biomass of spinach by 15.51% compared to control and registered the highest accumulation of Cd in shoots and roots of spinach by 2.95 mg kg-1 and 2.45 mg kg-1, respectively. Therefore, 20 t ha-1 vermicompost applications may be recommended to enhance dry biomass of spinach. The response of vermicompost was observed ameliorative in Cd-contaminated plots.

Keywords : Cadmium, vermicompost, spinach, uptake

INTRODUCTION

Contamination of the environment by heavy metals has increased sharply at the beginning of the 20th century, as a result of industrial revolution and excessive population growth, posing major environmental and human health problems worldwide (Abdelhafez and Li, 2014). Several contamination sources contaminated large areas over the world, i.e., emissions from waste incinerators, car exhaust, residues from mining and military activities, smelting industry and the use of agricultural amendments (sludge or urban composts, pesticides, and mineral fertilizers (Abou-Shanab et al., 2011, Abdelhafez et al., 2012). Unlike organic contaminants, heavy metals are not biodegradable, and pose a critical concern to living organisms and the environment through their action as carcinogenic and mutagenic compounds (Wu et al., 2018).

Plants grown in polluted environment can accumulate heavy metals at high concentration causing serious risk to human health when consumed. Moreover, heavy metals are toxic because they tend to bioaccumulate in plants and animals, bioconcentrate in the food chain and attack specific organs in the body ((Akinola et al., 2006; Chatterjee and Chatterjee, 2000). Plant species have a variety of capacities in removing and accumulating heavy metals. So there are reports indicating that some plant species may accumulate specific heavy metals (Markert, 1993). The uptake of metals from the soil depends on different factors, such as their soluble content in it, soil pH, plant species, fertilizers, and soil type (Lubben and Sauerberck, 1991). Vegetables, especially leafy vegetables, accumulate higher amounts of heavy metals (Sharma and Kansal, 1986). Roots and leaves of herbaceous plants retain higher concentration of heavy metal than stems and fruits (Yargholi and Azimi, 2008).

The present research work was, therefore, undertaken to assess the effect of cadmium and vermicompost interaction on dry biomass yield of spinach and cadmium concentration in shoot and root of spinach.

MATERIALS AND METHODS

Plant material and experimental layout:

The Sheila Dhar Institute experimental site, cover an area of 1 hectare, is located at Allahabad in northern India .A sandy clay loam soil, derived from Indo-Gangetic alluvial soil, situated on the confluence of river Ganga and Yamuna Alluvial deposit was sample for the study. The texture was sand (>0.2mm) 55.50, silt (0.002-0.2mm) 20.30, and clay (<.002mm) 24.20. the detail physico-chemical properties of the investigated soil have been given in the table 1:-

Parameters	Values
Texture Sandy clay Loam(Sand,Silt and Clay %)	(55.48,20.28,24.22, respectively)
pH	7.5
EC(dSm^{-1}) at 25C	0.26
Organic Carbon (%)	0.52
CEC[C mol(p$^+$) Kg^{-1}]	19.4
Total Zinc(%)	0.07
DTPA-extractable Cd (ppm)	0.27

Experimental:

After systematic survey factorial experiment was conducted to study the effect of Vermicompost on the uptake of Cd by spinach. The experiment was replicated thrice with nine treatments and conducted in completely factorial randomized block design (factorial RBD). After 24 hr of the treatment seeds were sown. Soil moisture was maintained by irrigating the crops at interval of 5-6 day spinach was grown successively in the 27 plots (each of1m2 in area).The treatments of vermicompost x Cd consisted of 0,10 and 20 t ha^{-1} vermicompost along with0, 10 and 20 mg kg^{-1} Cd. The source of Cd was $CdCl_2$.

Soil Sampling:

The larger fields were divided into suitable parts, and each of these uniform parts was considered a separate sampling unit. In each sampling unit, soil samples were drawn from several stop in a zig zag pattern, leaving about 2 m area along the field margins. Silt and clay were separated by Pipette method and fine sand by decantation (Chopra and Kanwar, 1999).

Extraction for Cadmium content in soil :

For total Cd content, 1 g of soil was mixed in 5 ml of HNO_3 (16M, 71%) and 5 ml of $HClO_4$(11M,71%).The composite was heated up to dryness. The volume was made up to 50 ml with got distilled water the samples were filtered using Whatman filter paper 42 (42.5mm). The clean filter was used for the estimation of cadmium using Atomic Absorption Spectrophotometer (AAS) (Analyst 600, Perkin Elmer Inc., MA, USA) (Kumar and Mani , 2010).

Soil physico-chemical analysis:

Soil pH was measured with 1:2.5 soil water using Elico digital pH meter (Model LI 127, Elico Ltd., Hyderabad, India) at author laboratory. Double distilled water was used for preparation of all solution. Organic carbon was

determined by chromic acid digestion method, cation exchange capacity (CEC) by neutral 1N ammonium acid solution. Total nitrogen by digestion mixture (containing sulphuric acid, selenium dioxide and salicylic acid) using micro kjeldhal method. Total phosphorus was determined by hot plate digestion with HNO_3 (16 M, 71%) and extraction by standard ammonium molybdate solution (Chopra and Kanwar 1999; Kumar and Mani 2010).

Plant analysis:

Plant was harvested after 60 days having higher phyto-chemicals their maturity stage as suggested by (Mani et al.2012). Sample were carefully rinsed with tap water followed by 0.2%ditergent solution, 0.1N HCl, de-ionized water, and double distilled water. Sample were dried in a hot- air oven at a temperature of 60 °C and ground to a fine powder. Plant dry biomass weight was recorded.

Determination of Cadmium in Plant extract:

One gram of ground plant material was digested with 15 ml of tri acid mixture (Kumar and Mani,2010) containing conc. HNO_3(16M,71%), $H2SO_4$ 18M, 96%) and $HClO_4$(11M,71%) in 5:1:1,heated on hot plate at low heat(60 °C) for 30 minutes and Cadmium were determined by the Atomic Absorption Spectrophotometer (Analyst 600, Perkin Elmer Inc. MA, USA).

Statistical analysis

Statistical analysis data were analyzed by factorials analysis of variation (ANOVA) using various treatment as independent factors with the help of the sum of square (SS) and degree of freedom (DF). The standard error (SE) is given by where, VE is the variance due to the error, n is the number of replications, and the critical difference (CD) is given by $CD = SE_{diff} \times t_{5\%}$ ($t_{5\%}$= 2.042 at DF_{error} =30 was observed) and standard deviation (Syx) were determined in accordance with Motulsky and Christopoulos (2003). MS-Excel 2007 software was used for drawing figures.

RESULTS AND DISCUSSION

The data given in table-1 and fig.1 indicate highly significant of Cd, vermicopost and Cd x Vermicompost interaction on influencing the dry biomass yield of spinach addition of vermicompost increase the dry biomass of spinach 26.51% over the control added single dose of Cd 10 $mgkg^{-1}$ and 20$mgkg^{-1}$ individually reduced the dry biomass of spinach by 3.79% and 15.15% over the control, respectively. The addition of combined treatment Cd 10 $mgkg^{-1}$ + vermicompost 20 t ha^{-1} and Cd 20mg kg^{-1} + vermicompost 20 ton ha^{-1} individual increase the dry biomass yield of spinach by 22.22% and9.09%.

Table-1. Effect of Cd X vermicompost interaction on dry biomass yield of spinach (g/plots)

Treatment Cd mg kg^{-1}, vermicompost t ha^{-1}	Replication			
	R_1	R_2	R_3	Mean
Cd_0 + vermicompost o	230	205	225	220
Cd_0 + vermicompost 10	255	265	260	260
Cd_0 + vermicompost 20	275	285	275	278.33
Cd_{10} + vermicompost 0	215	205	215	211.67
Cd_{10}+ vermicopost 10	245	235	225	235
Cd_{10} +vermicompost20	275	255	280	270
Cd_{20} +vermicompost 0	175	190	195	186.67
Cd_{20} +vermicompost10	225	240	245	236.67
Cd_{20} + vermicompost 20	265	270	255	263.33

SE= 8.79 CD= 18.63

ANOVA TABLE

Source of Variation	D.F.	S.S.	M.S.S.	Variation Ratio	F-Table	
					0.05%	0.01%
Replication	2	35.19	17.58	0.18	3.67	6.23
S.S due to Cd	2	2696.30	1348.15	13.50**	3.67	6.23
S.S due to vermicompost	2	6257.41	3128.70	31.32**	3.67	6.23
S.S due to Cd X vermicompost	4	13237.04	3309.26	33.13**	3.01	4.77
Error	16	1592.15	99.88			

Fig.-1. Effect of Cd x vermicompost on dry biomass yield of spinach

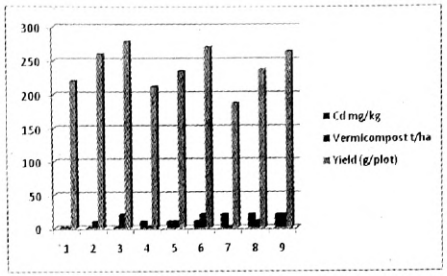


Fig.-2. Cd concentration in shoots of spinach ($mgkg^{-1}$)

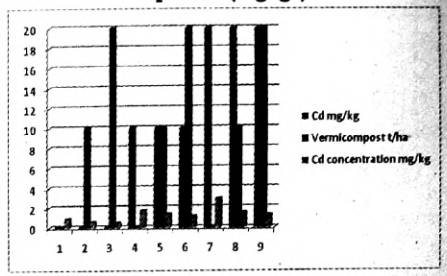


Table-2. Effect of Cd x vermicompost on Cadmium concentration in spinach shoots ($mgkg^{-1}$)

Treatment Cd $mgkg^{-1}$ vermicompost t ha^{-1}	Replication			
	R_1	R_2	R_3	Mean
Cd $_0$+ vermicompost 0	0.95	1	0.85	0.93
Cd_0+ vermicompost 10	0.55	0.7	.52	0.59
Cd_0 + vermicompost 20	0.47	0.6	0.5	0.52
Cd_{10}+ vermicompost 0	1.65	1.78	1.8	1.74
Cd_{10}+ vermicompost10	1.38	1.4	1.48	1.42
Cd_{1o}+vermicompost 20	1.15	1.2	1.1	1.15
Cd_{20}+ vermicompost0	2.9	2.85	3.1	2.95
Cd_{20}+ vermicompost10	1.6	1.45	1.6	1.55
Cd_{20}+vermicompost 20	1.25	1.38	1.35	1.33

SE= 0.7 CD=6.14

ANOVA TABLE

Source of Variation	D.F.	S.S.	M.S.S.	Variation Ratio	F-Table	
					0.05%	0.01%
Replication	2	0.01	0.01	1.02*	3.67	6.23
S.S. due to Cd	2	6.88	3.44	505.96**	3.67	6.23
S.S due to vermcompost	2	0.83	0.42	61.33**	3.67	6.23
S.S due to Cd XVermicompost	4	4.99	1.25	183.54**	3.01	4.77
Error	16	0.11	0.01			

Table-3. Effect of Cd x vermicompost on Cadmium concentration in spinach roots ($mgkg^{-1}$)

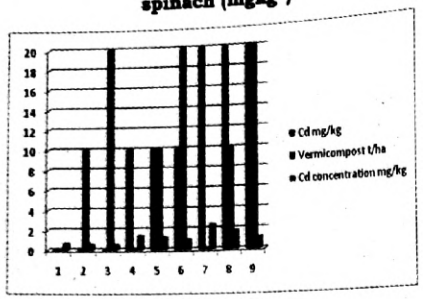
Treatment Cd $mgkg^{-1}$ vermicompost t ha^{-1}	Replication			
	R_1	R_2	R_3	Mean
Cd $_0$+vermicompost 0	0.62	0.70	0.8	0.71
Cd_0+ vermicompost 10	0.63	0.50	0.68	0.60
Cd_0 + vermicompost 20	0,62	0.48	0.6	0.57
Cd_{10}+vermicompost0	1.38	1.4	1.57	1.45
Cd_{10}+ vermicompost10	1.25	1.18	1.35	1.26
Cd_{1o}+vermicompost20	1	1.05	0.95	1
Cd_{20}+ vermicbmpost 0	2.53	2.38	2.44	2.45
Cd_{20}+vermicompost 10	1.85	1.82	1.75	1.81
Cd_{20}+vremicompost 20	1.2	1.1	1.18	1.16

SE= 0.06 0CD= 0.12

ANOVA TABLE

Source of Variation	D.F.	S.S.	M.S.S.	Variation Ratio	F-Table	
					0.05%	0.01%
Replication	2	0.03	0.01	2.91	3.63	6.23
SS due to Cd	2	5.00	2.50	502.02**	3.63	6.23
SS due to vermicompost	2	0.23	0.11	23.07**	3.63	6.23
SS due to Cd x Vermicompost	4	3.87	0.97	194.40**	3.01	4.77
Error	16	0.08	0.00			

Fig.-3. Cd concentration in roots of spinach (mgkg^{-1})



The data given in (Table-2,3 and Fig.-2,3) indicate that when high dose cadmium @ 20 mgkg^{-1} treated plot increase the maximum concentration of cadmium in spinach shoots and roots by 2.95 mgkg-1 and 2.45mgkg^{-1} but single high dose of vermicompost @ of 20 t ha^{-1} treated plots decrease the lowest concentration of cadmium in shoots and roots of spinach by 0.52 mgkg-1and 0.57 mgkg^{-1}.

The increasing level of cadmium in the increase of Cd concentration in spinach shoots and roots but when can it was applied with vermicompost then cadmium concentration reduced in shoots and roots. The overall effect of vermicompost on the concentration of cadmium was variable application of combined treatment of cadmium @ of 20 mgkg^{-1} + vermicompost @ of 20 t ha^{-1} increased the accumulation of Cd concentration in shoots and roots of plant by 1.33 mgkg-1 and 1.16 mgkg^{-1}.

CONCLUSION

It was observed that vermicompost application20 ton ha^{-1} increased the yield of spinach by 26.51% over the control and decreased cadmium concentration particularly in shoots and roots of spinach by 2.95 mgkg^{-1} and 2.45 mgkg^{-1}, respectively. However, application of Cd without vermicompost application reduced the yield of spinach and increased Cd concentration particularly in shoots and roots of spinach.

The reduced uptake of Cd was observed in vermicompost treated plots. The authors conclude to applied vermicompost @ of 20 t ha^{-1} reduce Cd uptake in shoot of spinach grown Cd contaminated soils.

The following conclusion could be drawn from the present investigation:

- Cd is not beneficial in plant growth and reduces the plant growth and yield of plant because it has tendency to accumulate in shoots of the vegetables grown in Cd polluted soils.
- Application of vermicompost reduces Cd accumulation in plant and high dose of vermicompost 20 t ha-1 should be applied in highly Cd polluted soil.
- Plants grown in soil containing high levels of Cd show visible symptoms of injury reflected in terms of chlorosis, growth inhibition, browning of root tips and finally death (Sanita di Toppi and Gabbrielli 1999; Wojcik and Tukiendorf 2004; Mohanpuria et al. 2007; Guo et al. 2008).

REFERENCES

1. Abdelhafez and Li, 2014 Geochemical and statistical evaluation of heavy metal status in the region around Jinxi River, China Soil Sediment. Contam., 23 (2014), pp. 850-868.
2. Abou-Shanab et all; 2011 R.A.I. Aboub Sanab. Bioremediation: new approaches and trends M.S. Khan (Ed.), Biomanagement of Metal-Contaminated Soils, Environmental Pollution, Springer Publications, NY, USA (2011), pp. 65-94.
3. Akinola, M.O., Njoku, K.L., Ekeifo, B.E., 2008. Determination of lead, cadmium and chromium in the tissue of an economically important plant grown around a textile industry at Ibeshe, Ikorodu area of Lagos State, Nigeria. Advances in Environmental Biology 2(1): 25–30.

4. Chatterjee, J., Chatterjee, F., 2000. Phytotoxicity of chromium, cobalt and copper in cauliflower. Environmental Pollution 109: 69–74.
5. Chopra, S.L. and Kanwar, J.S., 1999. Analytical Agricultural Chemistry, Kalyani Publication, New Delhi.
6. Guo J, Dai X, Xu W, Ma M (2008) Over expressing GSHI and AsPCSI simultaneously increases the tolerance and accumulation of cadmium and arsenic in Arabidopsis thaliana. Chemosphere 72:1020–1026
7. Kumar, C. and Mani, D., 2010. Enrichment and management of heavy metals in sewage irrigated soil.Lap LAMBERT Acad. Publishing, Dudweiler (Germany).
8. Lubben, S., Sauerberck, D., 1991. The uptake and distribution of heavy metals by springwheat. Water, Air, and Soil Pollution 57/58: 239–247.
9. Mani, D., Sharma, C., Pathak, N. and Balak, S., Helianthus annuus L in sewage-irrigated Indo-Gangetic alluvial soils. Int. J. Phytoremediat., 14(3), 235-246.
10. Markert, B., 1993. Plant as Biomonitors: Indicators for Heavy Metals in the Terrestrial Environment. (B. Markert, ed.), VCH Weinheim, New York /Basel Cambridge.
11. Mohanpuria P, Rana NK, Yadav SK (2007) Cadmium induced oxidative stress influence on glutathione metabolic genes of Camella sinensis (L.). O Kuntze. Environ Toxicol 22:368–374.
12. Motulsky, H. J. and Christopoulos, A., 2003.Graph Pad Software Inc, San Diego CA.
13. Sanita di Toppi L, Gabbrielli R (1999) Response to cadmium in higher plants. Environ Exp Bot 41:105–130.
14. Sharma, V.K., Kansal, B.D., 1986. Heavy metal contamination of soils and plants with sewage irrigation. Pollution Research 4: 86–91.
15. Wojcik M, Tukiendorf A (2004) Phytochelatin synthesis and cadmium localization in wild type of Arabidopsis thaliana. Plant Growth Regul 44:71–80.
16. Wu et al., 2018, W. Wu, P. Wu, F. Yang, D. Sun, D. Zhang, Zhou Yi Assessment of heavy metal pollution and human health risks in urban soils around an electronics manufacturing facility Sci. Total Environ., 630 (2018), pp. 53-61.
17. Yargholi, B., Azimi, A. A., 2008. Investigation of Cadmium absorption and accumulation in different parts of some vegetables. American-Eurasian Journal of Agricultural & Environmental Sciences 3(3): 357–364.

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DISTRIBUTION OF BACILARIOPHYCEAE AND ITS COMPOSITION IN THE FOOT HILLS OF RIVER GANGA (THE NAGINI GAD)

Jyoti Verma, Prateek Srivastava* and Hemlata Pant

Department of Zoology, CMP PG College, University of Allahabad, Allahabad-211002(U.P.), India

*Department of Botany, CMP PG College, University of Allahabad, Allahabad-211002,

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ABSTRACT

Diatoms are being extensively used as efficient biological indicators of organic pollution, eutrophication or acidification in mountain waters. In view of this diversity and composition of epilithic diatom flora was examined for a lesser Himalayan stream (Nagni Gad). The samples were collected at 4 distantly located (10-30 km apart) stations from source to mouth. One hundred sixteen taxa of twenty seven genera were reported from the Nagni Gad in the lesser Himalaya.

Keywords : distribution, diatoms, lesser himalaya, longitudinal changes.

INTRODUCTION

Diatoms are being efficiently used as biological indicators of organic pollution, eutrophication or acidification in various mountain chains of the world. The diatom flora of numerous mountain streams and rivers has been examined for reference conditions (Kawecka 1971; 1974; Kawecka and Olech 2004). The Himalaya is being increasingly used as reference location (Ormerod et al. 1994; Rothfritz et al. 1997; Nautiyal et al. 2004 a). However, the Himalaya with a mosaic of climatic conditions along its length and width remains less explored (Jüttner et al. 1996, 1998; Nautiyal and Nautiyal 1999; Cantonati et al. 2001; Jüttner and Cox 2001; Nautiyal et al. 2004 b).

Many Himalayan rivers find their source in the Greater Himalaya. Numerous streams and rivulets originate in the Lesser Himalaya and Shivaliks. These streams are traditionally used to irrigate land for subsistence agriculture. Inhospitable terrain and climatic extremes limit human habitations in the Greater Himalaya; compared with the Lesser Himalaya and Shivaliks where the terrain and climate are hospitable and the habitations increase in size and number. In the Himalayan part of the Gangetic basin larger towns exist in the valleys along the major rivers Bhagirathi and Alaknanda (parent tributaries of the Ganga). The national highways along them have lead to expansion of such towns which have impacted these rivers. In other parts of the Ganga basin,

smaller towns and villages prevail where the streams can serve as reference conditions.

Presént study examines the flora of lesser Himalayan stream the Nagni Gad. The stream joins the Ganga at Shivpuri ca. 15 km upstream of foothills near Rishikesh. The basin is impacted only by villages and water abstraction for irrigation in the headwaters and middle parts. The lower stretch is devoid of villages except for the confluence where the river is impacted by rafting related activities. Thus, the diatom flora of this lowly impacted stream was examined along its course from source to mouth to record reference conditions for understanding the changes in streams under greater human influence.

STUDY AREA

The stream north Hiyunl Gad, also known as Nagni Gad (Nagni is a locality in the middle stretch) originates in lesser Himalaya from Surkhanda peak (2930 m asl) and flows down ca. 142 km to join the lower course of the Ganga in mountains, ca. 15 km upstream of foothill town Rishikesh. It is formed by the confluence of four parent streams, the Hiyunl Gad, Nadi; Bemunda Gad, Pilri Gad and Chamol Gad. The stream width does not vary much from source to mouth. Oak (Quercus inacana) is dominant in the upper catchment but banks are covered with bushes and shrubs while mixed forest was observed near confluence with the Ganga. It is extensively regulated for irrigation. Four stations were selected from source to mouth (Table 1) in the headwater, middle and lower zone of the stream. Cobble, pebble, prismatic maturing boulder and silt formed the substrate at these stations. Nagni, Jajal and Shivpuri are small settlements near N2, N3 and N4. The stream width does not vary much from source to mouth.

MATERIALS AND METHODS

Samples of epilithic diatoms were obtained from four sampling station by scraping boulder surface (3 x 3 cm). Samples were treated with Hydrochloric acid and cleaned in hydrogen peroxide. The permanent mounts were prepared in Naphrax and examined with UPLANAPO x100 oil immersion objective. Identifications were made according to standard literature (Schmidt 1874-1959; Hustedt and Jensen 1985; Krammer and Lange-Bertalot 1986-1991; Gandhi (1998); Krammer 2002; 2003; Lange-Bertalot 2001; Werum and Lange Bertalot 2004; Metzeltin et al. 2005). The permanent mounts have been adequately stored at the Aquatic Biodiversity Unit, Department of Zoology, H. N. B. Garhwal University, Srinagar, India.

RESULTS AND DISCUSSION

Flora: The diatom flora of the Nagni Gad was represented by 6 major families (table 2): Melosiriaceae (1 spp.), Fragilariaceae (9), Achnanthaceae (29), Naviculaceae (73), Bacillariaceae (15) and Surirellaceae (3). Melosiriaceae was represented by one taxon of Melosira at all stations. Fragilariaceae occurred as Synedra and Staurosira. Achnanthaceae comprised Achnanthidium, Achnanthes, Planothidium and Cocconeis. Naviculaceae consisted of thirteen genera at N1 and fourteen from N2 to N4, of which 4 to 5 genera had only one taxon except at N2. Bacillariaceae consisted of Denticula and Nitzschia at all stations. Surirellaceae comprised Cymatopleura and Surirella, which were absent at N2 and only Surirella was present at N3 (Table 2). The taxa-rich genera were Navicula, Cymbella, Achnanthidium and Nitzschia at N1 and N2 while Navicula, Achnanthidium, Cymbella and Nitzschia at N3 and N4 in descending order.

One hundred sixteen taxa were reported from the four different stations of Nagni Gad in the lesser Himalaya. In the neighbouring countries 310 taxa of 34 genera

were reported from Sri Lanka and 378 taxa from Thailand (Foged 1971a-b, 1976). The flora has also been examined in the adjacent and distant mountain regions; 36, 38 and 60 taxa from Arun, Kathmandu and Likhu Khola Valley in the Nepalese middle Hills (Jüttner et al. 1996), 96 taxa from west Nepal Himalaya (Rothfritz et al. 1997), 157 taxa from Nepal Himalaya (Ormerod et al. 1994), 141 taxa from Kumaun Himalaya (Jüttner and Cox 2001), 182 taxa from Alps and Himalaya (Cantonati et al. 2001), 167 taxa from Polish high Tatra Mts. (Kawecka 1971) and 178 taxa from Rila-Bulgaria (Kawecka 1974).

The estimate of taxonomic richness from certain parts of the Himalaya has not exceeded 200 taxa in e. g. 189 taxa during present study only, the adjoining Kumaun (Jüttner and Cox 2001), Nepal (Ormerod et al. 1994, 1997, Jüttner et al. 1996, Rothfritz et al. 1997), eastern Himalaya (Rout and Gaur 1994) and even the Alps (Cantonati et al. 2001).

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Table-1. Geographical co-ordinates of the sampling stations in different rivers of the Central Highland and Himalayan region.

River system	Rivers/ Stations with acronym	Latitude (N)	Longitude (E)	Altitude (m asl)	Distance from source (Km.)	Substrate
Ganga	Nagni N					
(foothill)	Khiret N1	30° 23'25"	78°19'30"	2200	16	P-MB
	Nagni N2	30° 19'15"	78°21'10"	1400	79	B, Cb
	Jajal N3	30° 18'15"	78°20'40"	1200	98	Cb, Pb, Gr
	Shivpuri N4	30° 8'15"	78° 23'30"	375	142	B, Cb, Pb, Gr, Si

R = rock, P-MB = prismatic and maturing boulder, B = boulders, Cb= cobble, Pb= pebble, Gr = gravel, Sd = sand Si = silt = Cl= clay/muddly, Av = aquatic vegetation.

Table-2. Taxonomic composition: Longitudinal variation in number of species in different genera present in the Nagni gad.

GENERA	N 1	N 2	N 3	N 4
MELOSIRACEAE				
1. Melosira	1	1	1	1
FRAGILARIACEAE				
2. Staurosira	1	2	2	1
3. Synedra	5	4	4	6
ACHNANTHACEAE				
4. Achnanthes	1	1	1	1
5. Achnanthidium	14	15	16	16
6. Planothidium	5	6	4	4
7. Cocconeis	2	4	3	4

GENERA	N 1	N 2	N 3	N 4
NAVICULACEAE				
8. Amphipleura	1			
9. Amphora	3	3	2	3
10. Caloneis	2	1		1
11. Cymbella	17	15	13	13
12. Encyonema	2	3	2	3
13. Encyonopsis	2	2	2	3
14. Reimeria	2	2	2	2
15. Gomphonema	7	9	8	8
16. Navicula	19	19	17	19
17. Navicula sensu lato	3	3	3	3
18. Adlafia	2	1	2	2
19. Geissleria		1	1	1
20. Hippodonta	1	1	1	2
21. Placoneis		1	1	1
22. Sellaphora	1		1	1
23. Stauroneis		1	1	
BACILLARIACEAE				
24. Denticula	1	1		1
25. Nitzschia	9	10	12	13
SURIRELLACEAE				
26. Cymatopleura	1			1
27. Surirella	2		1	2
TOTAL	104	106	100	112

REFERENCES

1. Antoniades D., Douglas M.S.V. (2002) Characterization of high arctic stream diatom assemblages from Cornwallis Island, Nunavut, Canada. Canadian Journal of Fisheries and Aquatic Sciences 80: 50-58.
2. Antoniades D., Douglas M.S.V., Smol A. (2005) Benthic diatom autecology and inference model development from the Canadian high Arctic Archioelago. Journal Phycologica 41: 30-45.
3. Bellinger B.J., Cocquyt C., O'reilly C.M. (2006) Benthic diatoms as indicators of eutrophication in tropical streams. Hydrobiologia 573: 75-87.
4. Beverly J.B., Olive J.H. (1995) Diatom Communities in the Cuyahoga River (USA): Changes in Species Composition between 1974 and 1992 Following Renovations in Wastewater Management. Ohio Journal of Science 95(3): 254-260.
5. Blinn D.W., Herbst D.B. (2003) Use of diatoms and soft algae as indicators of environmental determinants in the Lahontan Basin, USA. Annual Report to the California State Water Resources Board. 25 pp + appendices
6. Cantonati M., Corradini G., Jüttner I., Cox E.J. (2001) Diatom assemblages in high mountain streams of the Alps and the Himalaya. Beiheft zur Nova Hedwigia 123: 37-61.
7. Gandhi H.P. (1998) Fresh water Diatoms of Central Gujarat (With a review and some others). Bishan Pal Singh, Mahendra Pal Singh, Dehradun.
8. Hustedt F., Jensen N.G. (1985) Die Kieseialgen Deutschlands, Oesterrichs und der Schweiz Bd. 7, Teil 2. Translated by N.G. Jensen as The Pennate Diatoms (1985). Koeltz Scientific Books, Koenigstein. pp. 918.
9. Jüttner I., Rothfritz H., Ormerod S.J. (1996) Diatoms as indicators of river quality in the Nepalese Middle Hills with

consideration of the effects of habitat-specific sampling. Freshwater Biology 36: 475-486.

10. Jüttner I., Rothfritz H., Ormerod S. J. (1998) Diatom communities in Himalayan streams. In: Ecohydrology of High Mountain areas. In: Proceedings of the International conference on Ecohydrology of High Mountain Areas, (S. R. Chalise et al. eds.) March 23-28, Kathmandu, Nepal. p. 78-98.
11. Jüttner I., Cox E.J. (2001) Diatom communities in streams from the Kumaon Himalaya, North-West India. In A. Economou-Amilli (ed.), In: Proceedings of the 16th International Diatom Symposium. University of Athens: Greece, 237--248.
12. Kawecka B., Olech M. (2004) Diatom diversity of streams in Finnish Lapland and Maritime Antarctica. In: Proceedings 17th International Diatom Symposium, Ottawa, Canada 2002, (M. Poulin, ed.), p. 161-186.
13. Kawecka B. (1971) Zonal distribution of algal communities in streams of the Polish High Tatra Mts. Acta Hydrobiologia 13: 393--414.
14. Kawecka B. (1974) Vertical distribution of algae communities in Maljovica stream (Rila-Bulgaria). Polskie Archiwum Hydrobiologia 22: 371--420.
15. Komulaynen S.F. (2008) Phytoperiphyton community structure and distribution in the Teno River and its tributaries (Finnish Lapland). Boreal Environmental Research 13: 517--524.
16. Krammer K., Lange-Bertalot H. (1986-1991) Bacillariophyceae. Die Süsswasserflora von Mitteleuropa. Vol. 2/1 Naviculaceae, p.1-876 mit 206 pl. Vol. 2/2 Bacillariaceae, Epithemiaceae, Surirellaceae, p. 1-596 (1988). Vol 2/3 Centrales, Fragilariaceae, Eunotiaceae, p. 1-576 (1991). Vol. 2/4 Achnanthaceae, Kritische Erganzungen zu Navicula (Lineolatae) und Gomphonema. P. 1-437 (1991). Vol. 5 English and French translations of the keys and supplements. Stuttgart and Heidelberg.
17. Krammer K. (2002) Diatoms of Europe - Vol 3, The genus Cymbella, A. R. G. Gantner Verlag K. G., pp. 584, 194 plates.
18. Krammer K. (2003) Diatoms of Europe - Vol 4, The genus Cymbopleura, Delicata, Navicymbula, Gomphocymbellopsis, Afrocymbella, A. R. G. Gantner Verlag K. G., pp. 520, 164 plates.
19. Lange-Bertalot H. (2001) Diatoms of Europe - Vol 2, The genus Navicula sensu stricto 10 Genera Separated from Navicula sensu lato Frustulia, A. R. G. Gantner Verlag K. G., pp. 518, 140 plates.
20. Medvedeva L.A. (1998) Diversity of diatoms in Sikhote-Alin Biosphere reserve, Far East Russia. In: Proceedings 15th International Diatom Symposium 1998, Perth, ARG Ganter Verlag K. G. p. 193-200.
21. Metzeltin D., Lange-Bertalot H., Garcia-Rodriguez F. (2005) Diatoms of Uruguay. Taxonomy-Biogeography-Diversity (Annotated Diatom Micrographs ed Lange Bertalot H) Iconographia Diatomol 15, A. R. G. Gantner Verlag K. G., pp. 726, 240 plates.
22. Nautiyal P., Kala K., Nautiyal R. (2004 a) A preliminary study of the diversity of diatoms in streams of the Mandakini basin Garhwal Himalaya. In: Proceedings of 17th International Diatom Symposium (M. Poulin, ed.), Ottawa, Canada, 2002 Biopress, Bristol. p. 235-269.
23. Nautiyal P., Nautiyal R., Kala K., Verma J. (2004 b) Taxonomic richness in the diatom flora of Himalayan streams (Garhwal, India). Diatom 20: 123--132.
24. Nautiyal R., Nautiyal P. (1999) Altitudinal variations in the pennate diatom flora of the Alaknanda-Ganga river system in the Himalayan stretch of Garhwal region. In: Proceedings of Fourteenth International Diatom Symposium (S. Mayama, M. Idei and I. Koizumi, eds.), Koeltz Scientific Books, Koenigstein, 85-100 pp.
25. Ormerod S.D., Rundle S.M., Wilkinson G.P., Daly K.M., Jüttner I. (1994) Altitudinal trends in the diatoms bryophytes, invertebrates and fish of a Nepalese river system. Freshwater Biology 32: 309-322.
26. Rimet F., Ector L., Cauchie H.M. Hoffmann L., (2004) Regional distribution of diatom assemblages in the headwater streams of Luxembourg. Hydrobiologia 520: 105-117.
27. Rothfritz H., Jüttner I., Suren A.M., Ormerod S.J. (1997) Epiphytic & epilithic diatom communities along environmental gradients in the Nepalese Himalaya implications for the assessment of biodiversity water quality Arch. Hydrobiologia 138: 465-482.
28. Sabater S., (1990) Phytoplankton composition in a medium-sized Mediterranean river: The Ter (Spain). Limnetica 6: 47-56.
29. Schmidt A. (1874-1959) Atlas der Diatomaceen-Kunde. Heft 1-120, Tafeln 1-480 (Tafeln 1-216 A Schmidt; 213-216 M Schmidt; 217-240 F Fricke; 241-244 H Heiden; 245,246 O Muller; 247-256 F Fricke ; 257-264 H Heiden; 265-268 F Fricke; 269-472 F Hustedt). Aschersleben and Leipzig.
30. Werum M., Lange-Bertalot H. (2004) Diatoms in springs from Central Europe and elsewhere under the influence of hydrogeology and anthropogenic impacts. Ecology- Hydrogeology- Taxonomy, (H. Lange-Bertalot, ed.), 480. Iconographia Diatomologia, 13, A. R. G. Gantner Verlag K. G.

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INFLUENCE OF STRATIFICATION DURATION AND KIND OF MEDIA IN AONLA (EMBLICA OFFICINALIS, GAERTN) SEED

Surya Narayan
Department of Horticulture,
Kulbhaskar Ashram Post Graduate Collage, Allahabad, 211001, (U.P.), India

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ABSTRACT

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh with a view to standardize suitable stratification duration and kind of media for Aonla seed treatment. There were seven treatment combinations (T1 to T10) including a control. Different duration of seed stratification i.e., 24hours,48 hours and 72hours were tried along with the sterilized sand, sterilized Leaf mould, sterilized Cocopeat seed treatment media . Seeds were sown in the polythene bags (25x15 cm size, 200gauge thick) containing sterilized sand, sterilized Leaf mould, sterilized Cocopeat . It was interesting to note that the effect of stratification duration and kind of media was found to be significant for seed germination, transplanting success, seedling mortality percentage and rate of seed germination. Treatment T6 (48hr + sterilized Cocopeat) yielded highest percentage, (85.00) of seed germination while the lowest percentage value (38.25) was recorded in T8 (72hrs+Leaf mould) treatment. The seedling mortality percentage was also maximum (80.25) with T8 where as lowest percentage value (23.00) was observed for T6 treatment. It may be concluded that T6 treatment can be recommended for the better stand establishment of Aonla nursery.

Keywords : Stratification, treatment, media, nursery, aonla, mortality, seedling, germination, seed.

INTRODUCTION

Increased demand of aonla (Emblica officinalis, Garten.) buddlings in traditional as well as nontraditional areas of India due to its peculiar character of diverse use, medicinal value, tolerance to biotic and abiotic stresses, higher benefit cost ratio and positive government policies emphasized to chalk out some feasible and acceptable measures for the better stand-establishment of saplings at the nursery stage. Aonla buddlings are prepared thorough budding on seedling root - stock which is obtained through seeds. In nature, aonla seed has poor germination and higher seedling mortality, owing to adverse edaphic conditions during nursery stage. Therefore it becomes imperative to standardize suitable stratification time and exact kind of media for seed treatment for flourishing the aonla nursery-industry. Certainly, these tactics are the most important component to provide sound base for propagation, once duration and media is standardize, we shall be able to grow healthy seedlings with faster rate.

Keeping these aspects in view, the experiment was under taken to ascertain the effect of the stratification and kind of media on seed germination, rate of seed germination, transplanting success and mortality of seedlings.

MATERIALS AND METHODS

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh during the year 2015-16 with a view to standardize suitable stratification duration and kind of media for Aonla seed treatment. There were ten treatment combinations (T_1 to T_{10}) including a control. Different duration of seed stratification i.e., 24hours, 48 hours and 72hours were tried. Soaked seed were put in layers under different strata of moist sterilized sand, sterilized Leaf mould and sterilized Cocopeat for as per treatment. Seeds were sown in the polythene bags (25x15 cm size, 200gauge thick) containing soil, sand and FYM mixture (1:1:1).

Table-1. Enfluence of stratification duration and kind of media on seed germination and rate of seed germination in Aonla (Emblica officinalis, GAERTN.)

Treatments	Seed germination (%)								*Rate of seed germination*
	3 DAS	6 DAS	9 DAS	12 DAS	15 DAS	18 DAS	21 DAS	27 DAS	*Mean days taken in seed germination*
T_1 (24hrs+ sterilezed sand)	3.95 (10.89)	23.66 (24.29)	44.33 (36. 4)	49.33 (38.06)	54.66 (41.92)	57.00 (46.12)	57.00 (46.12)	57.00 (46.12)	11.43
T_2 (24hrs+ sterilezed Leaf mould)	4.05 (11.03)	23.66 (26.29)	46.33(39.4 0)	51.33 (41.06)	59.66 (46.92)	61.00 (51.12)	61.00 (51.12)	61.00 (51.12)	11.25
T_3 (24hrs+ sterilezed Cocopeat	4.25 (11.30)	25.66 (29.29)	48.33 (41.4)	54.33 (46.06)	61.66 (49.92)	62.00 (53.12)	62.00 (53.12)	62.00 (53.12)	11.01
T_4 (48 hrs+ sterilezed sand)	3.36 (9.83)	26.66 (31.29)	50.33 (45.4)	56.33 (49.06)	64.66 (53.92)	65.00 (54.12)	65.00 (54.12)	65.00 (54.12)	12.40
T_5 (48hrs+ sterilezed Leaf mould	4.60 (11.82)	26.66 (31.33)	52.33 (46.76)	62.66 (52.75)	65.66 (54 .5)	66.00 (54.72)	66.00 (54.72)	66.00 (54.72)	12.24
T_6 (48hrs+ sterilezed Cocopeat	6.63 (14.55)	28.66 (32.64)	58.66 (50.41)	65.00 (52.13)	84.33 (69.91)	85.00 (70.35)	86.00 (70.35)	86.00 (70.35)	12.03
T_7 (72 hrs+ sterilezed sand)	. 3.63 (11.75)	25.53 (34.21)	40.85 (40.44)	43.25 (42.44)	45.25 (43.44)	45.25 (43.44)	46.49 (44.21)	46.49 (44.21)	10.24
T_8 (72hrs+ sterilezed Leaf mould	3.33 (7.75)	24.53 (31.21)	40.25 (39.44)	41.25 (40.44)	42.25 (41.44)	42.25 (41.44)	42.25 (41.44)	42.25 (42.44)	10.01
T_9 (72hrs+ sterilezed Cocopeat	3.23 (6.75)	23.53 (29.21)	37.25 (37.44)	38.25 (38.44)	38.25 (38.44)	38.25 (38.44)	38.25 (38.44)	38.25 (38.44)	9.25
T_{10} (control)	3.53 (9.75)	21.53 (24.21)	33.25 (32.44)	44.12 (40.21)	49.00 (42.04)	50.54 (43.32)	(51.74) (44.49)	51.74 (44.49)	16.52
C.D. at 5%	2. 11	3.24	3.21	2.99	2.85	3.11	3.11	3.11	2.46

Note: figures in parentheses are average transformed value.

Table-2. Influence of stratification duration and kind of media on seedling mortality and transplanting success in Aonla (Emhlica officinalis, GAERTN.)

Treatments	*Seedling mortality (%)*					*Transplanting success (%)*
	28 DAS	35 DAS	42 DAS	49 DAS	56 DAS	
T_1 (24hrs+ sterilezed sand)	13.00 (23.30)	24.09 (33.04)	29.93 (35.91)	36.01 (39.03)	36.01 (39.03)	75.43
T_2 (24hrs+ sterilezed Leaf mould)	12.00 (22.30)	22.09 (31.04)	27.93 (33.91)	31.91 (35.03)	31.01 (35.03)	76.25
T_3 (24hrs+ sterilezed Cocopeat)	11.99 (22.10)	21.89 (30.94)	27.63 (33.81)	31.01 (34.93)	31.01 (34.93)	77.01
T_4 (48 hrs+ sterilezed sand))	9.99 (21.10)	20.99 (30.64)	26.66 (32.41)	30.00 (34.13)	30.00 (34.13)	80.40
T_5 (48hrs+ sterilezed Leaf mould)	9.63 (20.55)	20.66 (29.64)	24.66 (31.41)	27.00 (33.13)	27.00 (33.13)	82.24
T_6 (48hrs+ sterilezed Cocopeat)	8.63 (15.55)	19.66 (25.64)	21.66 (28.41)	23.00 (29.13)	23.00 (29.13)	92.03
T_7 (72 hrs+ sterilezed sand)	46.63 (40.75)	49.53 (41.21)	51.85 (44.44)	59.25 (53.44)	59.25 (53.44)	50.24
T_8 (72hrs+ sterilezed Leaf mould)	59.33 (52.75)	63.53 (56.21)	66.25 (58.44)	69.25 (59.44)	69.25 (59.44)	40.01
T_9 (72hrs+ sterilezed Cocopeat)	63.23 (56.75)	70.53 (59.21)	78.25 (63.44)	80.25 (66.44)	80.25 (66.44)	36.25
T_{10} (control)	47.63 (40.95)	50.53 (42.21)	52.85 (45.44)	60.25 (54.44)	60.25 (54.44)	66.52
C.D. at 5%	2.4 1	3.64	3.52	3.99	3.05	4.53

Note: figures in parentheses are average transformed value.

RESULTS AND DISCUSSION

Seed germination in aonla started after 4 days of seed sowing and completed within 28 days in all the treatment. Seed germination under different treatments ranged between 38.25 to 85.00 percent. The percentage of seed germination as influenced by treatments differed significantly The maximum seed germination (85.00 %) was recorded in treatment T6 (48 hrs + sterilized Cocopeat) which was significantly superior to all other treatments and the value was lowest (38.25%) in T8 (72 hrs + sterilized Leaf mould). The findings of the study supported and corroborated the findings of Bisla et al., (1984) in Ber and Govind and Chandra, (1993) in Khasi Mandarin. The lowest percentage of seed germination obtained with treatment T_8 indicated adverse effect of longer duration of stratification coupled with toxic concentration of chemical present in humus which augmented seed decay and partial damage of seed too. Over tendering of seed coat and ultra concentration of sticky leaf mould might be corroded the plume and radicle of the seed resulting failure of germination. The possibility of exo-osmosis may not be denied. Dewey, (1960); Paliwal & Gandhi (1968) and Ayers and Westcot (1976) also observed the same causes. There was insignificant difference on the rate of aonla seed germination as it was conspicuously influenced by various duration of stratification and seed treatment media. The faster rate of seed germination was recorded in T6 (48 hrs stratification+ sterilized Cocopeat) i.e.9.25 mean days followed by T7 (72 hrs stratification+ sterilized sand) i.e.,10.01 mean days. The slowest rate of seed germination was recorded T10 (control) i.e., 16.52 mean days. Similar result was also recorded by Bahuguna and Pyarelal, (1993) in case of Acacia and Shengzno et al (2006) in Batal. There was a noticeable and significant effect of treaments on transplanting success. All those treatments respond poor in seed germination also were poor in transplanting success. Though seeds were sown in polythene bags and gently transplanted into the field.

The differences due to various treatments in respect of seedling mortality differed significantly. The mortality of aonla seedling range between 23.00 to 80.25 per cent within 57 days of seed sowing. The highest mortality was recorded (80.25%) in T8 (72 hrs stratification+ sterilized Leaf mould).followed by 69.25 per cent in T5 (48 hrs stratification+ sterilized Leaf mould) and the value was lowest (23.00%) in T6 (48 hrs stratification+ sterilized Cocopeat) treatment. Similar results were also found by Awang and Hamzah (1986) in Acacia. Aonla seed putting under media more than 48 hours was proved detrimental in terms of seed germination and mortality. Therefore duration should not be more than 48 hours to achieve better survival of aonla seedlings. Obviously, more scorching of seed had toxic effect on tender seedlings and higher osmotic pressure, imbalanced nutrient level lead to mortality of the seedlings The findings are in the conformity of the findings of the Sharma et al., (1984) , Gupta,(1989), E. Medina et al (2005)

Based on the result obtained from investigation it can be concluded that seed stratification for 48 hours in sterilized Cocopeat resulted best performance with regards to percent seed germination (85.00%) and least seedling mortality (23.00%).

REFERENCES

1. Awang, K and Mohd. Basri Hamzah(2006).Effect of potting mixtures and fertilizers on the growth acacia seedlings .Malays. Appl.Biol.,15(1):31-42.
2. Ayers, R.S. and Wescot, D.W.(2006).Water quality of agriculture; irrigation and drainage. Paper. ;29: FAO, Rome,P. 97.
3. Bahuguna, V. K. and Pyarelal (2003) standardize of nursery techniques of acacia Part-II: Indian for. 119:211-216.
4. Bisla, SS. Singhrot, R.S. and Chauhan, KS (1984). Effect of growing media and urea application on seed germination and growth of ber. Haryana .J. Hort.Sci.13(3-4): 118-122.
5. Dewey, D. R.(1960). Salt tolerance of twenty five strains of Agropyron. Agron J.. 52, 631-635.
6. E. Medina -Sanchez, R.Lindig-Cisneros. (2005). Effect of scarification and growing media on seed germination of Lupin. Seed science and Technology. 33(1),237-241.
7. Govind, S. and Chandra, R.(2004).Standardization of suitable potting media for raising seedlings of Khasi Mandrin. Indian J Hort.,50(3):224-227.
8. Paliwal ,K.V. and Gandhi,A. P. (1968). Anion effect on germination of some jowar and paddy varieties in saline substrate .Indian .j. pl.physiol.11..62-67.
9. Gupta, G. N(2007). Influence of different soil mixtures on nursery growth of some arid zone tree species. Indian For.,I 18:952-959. Shengzno Fang, Jiayuanang,Zhaoyang (2006).Method to break seed dormancy in Batal. Scientia Horticulture 110(3), 305-309.
10. Shamet,G.S.;Chauhan,P.S. and Sood,R.(2004).Nursery studies on potting mixture on chilgoza pine .Indian. J. For.,17(3)..225-229.

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FIRST RECORD OF BRAUNSAPIS CUPULIFERA (VACHAL, 1894) (HYMENOPTERA, APOIDEA, APIDAE: XYLOCOPINAE: ALLODAPINI) FROM INDIA

Dibyajyoti Ghosh, Jagdish Saini*, Hirdesh Kumar and Kailash Chandra
Zoological Survey of India, M-Block, New Alipore, Kolkata-700053

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ABSTRACT

Braunsapis cupulifera (Vachal, 1894) first ever recorded from India; previous records of this species are from Indonesia, Malaysia, Philippines, Thailand, Vietnam, Myanmar and Singapore. There are nine species of this genus known from India as of today. This species is the tenth addition of the genus Braunspis Michener, 1969 from the Indian subcontinent.

Keywords : Allodapini, bee, distribution, indian himalayas, new record.

INTRODUCTION

Braunsapis is the only known genus of Allodapini from the oriental region, most species of this genus are black with ivory or yellow marks on the face and often on the pronotal lobes and tarsi. Reyes (1991) revised the genus Braunsapis and recognised 19 species from the oriental region and six species from India, Later Michener & Borges (2003), Jobiraj (2004) and Gupta, et al. (2015) added one each from Indian region.

Genus Brausnapis Michener, 1969 is represented by nine species from India, viz., B. mixta (Smith, 1852); B. cupulifera (Vachal, 1895); B. picitarsis (Cameron, 1903); B. puangensis (Cockerell, 1929); B. kaliago Reyes and Sakagami, 1990, B. indica Reyes, 1991; B. malliki Reyes, 1991; B. bislensis Michener and Borges, 2003; B. engeli Jobiraj, 2004 and B. chandrai Gupta, Sharma and Girish Kumar, 2015. The species B. cupulifera (Vachal, 1894) was previously recorded form Indonesia, Malaysia, Philippines, Thailand, Vietnam, Myanmar and Singapore; this current manuscript reports a new distributional record of the species B. cupulifera from India by the addition of tenth species of genus Braunsapis from the Indian subcontinent.

MATERIALS AND METHODS

The current manuscript is written based on a female specimen captured on wing at 13:45 HRS with an entomological net.

Weather on particular time was cool and breezy. Vegetation type of the area was a sub-tropical forest. Geocoordinates were recorded with the help of a Garmin GPS (Etrex- 30). Photographs were taken by Leica Stereo Zoom microscope. The specimen was identified with the help of illustrated keys by Reyes, 1991.

RESULTS AND DISCUSSION

Braunsapis cupulifera (Vachal, 1894) (Figs. 1,2)

Material examined:

1 Female. India, Arunachal Pradesh state, Changlang district, Namdapha Tiger Reserve, Deban (N27.50611°, E96.39611°, Alt-345.4mt.), 25.vi.2017, Coll. J. Saini & Party.

Diagnostic characters:

HW 1.431 mm. HW/HL ratio 1.09, Clypeus yellowish white with some dark patches, mandible black Clypeal mark as in Figure (1A) Labrum fuscoferrugineous, Paraocular mark absent. Scape yellow above. Tegula transparent, axillary sclerites yellow. Legs black except tarsi yellow, Hairs on T4-6 transparent and simple.

Measurements (in mm):

Length of Clypeus: 0.248 mm. The width of clypeus: 0.478 mm. Length of Eye: 0.966 mm. Eye width: 0.297 mm. Ocellar distance: 0.072 mm. Ocellocular distance: 0.295 mm. Head Width (HW): 1.431 mm. Head Length (HL): 1.303 mm. HW/HL: 1.0987 mm. Length of antenna: 1.022 mm. The distance between antennal sockets: 0.322 mm.

Distribution:

Indonesia, Malaysia, Philippines, Thailand, Vietnam, Myanmar and Singapore.

Remarks:

The female of the species Braunsapis cupulifera (Vachal, 1894) is distinguished by their narrower head (HW/HL ratio- 1.05- 1.09 mm) and yellow coloured clypeus, from the females of different species like Braunsapis hewitti (Cameron, 1908) and Braunsapis reversa (Cockerell, 1916)

Fig.-1. B. cupulifera Female A) head; B) dorsal view; C) lateral view D) abdomen, E) Fore Wing.

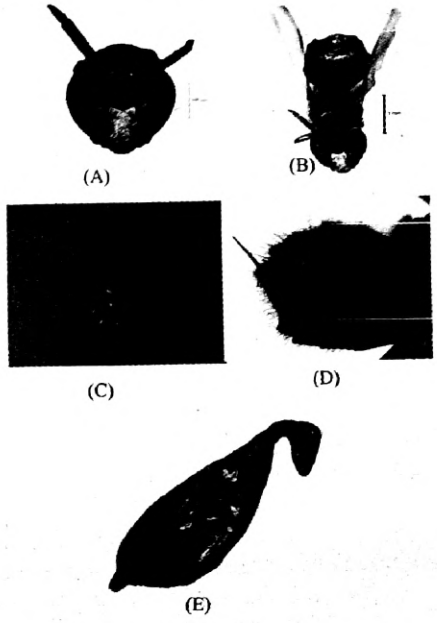

Fig.-2. Distribution of Genus Braunsapis Michener 1969 from India.

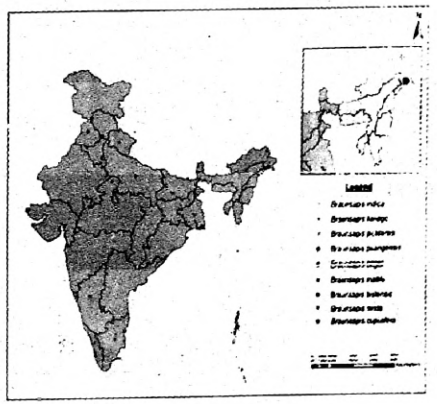

Table-1. Distribution of Genus Brausnapis Michener, 1969 in India:

Sl. no.	Braunsapis species	Distribution in India
	Braunsapis mixta (Smith, 1852)	Delhi, Bihar, Karnataka, Punjab, Madras, Tamil Nadu, West Bengal, Goa.
	Braunsapis cupulifera (Vachal, 1895)	Deban, Arunachal Pradesh *.
	Braunsapis picitarsis (Cameron, 1903)	Uttarakhand, Karnataka, Pondicherry, Tamil Nadu, Kerala.
	Braunsapis puangensis (Cockerell, 1929)	Punjab, Uttar Pradesh, Tamil Nadu, Delhi, Karnataka.
	Braunsapis kaliago Reyes and Sakagami, 1990	Mehruli, Near Delhi.
	Braunsapis indica Reyes, 1991	Tamil Nadu.
	Braunsapis malliki Reyes, 1991	Karnataka, Delhi.
	Braunsapis bislensis Michener and Borges, 2003	Karnataka.
	Braunsapis engeli Jobiraj,2004	Kerala, Karnataka.
	Braunsapis chandrai Gupta, Sharma and Girish Kumar, 2015	West Bengal.

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REFERENCES

1. Gupta, R. K., G Sharma and P. Girish Kumar. 2015. Description of Braunsapis Chandrai A New Species of Genus Braunsapis Michener (Hymenoptera, Apoidea, Apidae: Xylocopinae: Allodapini) From Sunderbans In West Bengal, India J. Env. Bio-Sci., 29 (2):373-375
2. Jobiraj, T. 2004. A new species, a new subspecies and a new record of Braunsapis Michener (Hymenoptera: Apidae) from India. Perspective on Biosystematics and Biodiversity T.C.N. Com. Vol. March: 527-538.
3. Michener, C. D., R. M. Borges, M. Zacharias and M. Shenoy. 2003. Journal of the Kansas Entomological Society 76(3): 518-522.
4. Reyes, S. G. 1991. Revision of the bee genus Braunsapis in the Oriental region, University of Kansas Science Bulletin 54:179-207.

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LEVEL OF FARMER'S PARTICIPATION IN WATERSHED DEVELOPMENT PROGRAMME IN CENTRAL UP

N. K. Mishra, Ramprakash Mishra and Chandrakant Tripathi
T.D. P.G. College Jaunpur, KVK, KNI, Sultanpur, (U.P.), India

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ABSTRACT

There are different extension agencies which provide required support in knowledge and essential guidance regarding conservation of rainwater for future use to the farmers farmer's are in touch with these agencies for the sake of conserving surface water as well as soil from degradation. This level of contact of extension personnel and beneficiary farmers was measured and found low in the selected area. The participation of beneficiaries in pre-project activities, planning, implementation, maintenance and aftercare and evaluation was observed as low in the study area.

Keywords : Watershed, people' participation, check dams, percolation tanks.

INTRODUCTION

People's participation in common parlance , is used to mean an 'act or fact of part taking' or 'sharing in'. According to Banki (1981) participation means ' a dynamic group process in which all members of a (work) group contribute, share or are influenced by the interchange of ideas and activities towards problem solving or decision making'. People's participation in watershed development is also needed for cost effective implementation of the programme. This is so because watershed approach requires that every field/parcel of land located in a watershed be treated with appropriate soil and water conservation measures and used according to its physical capability. Therefore it is necessary that every farmer who have land in the watershed accepts and implements the recommended watershed development plan. There are some components of watershed development plan such as bunding, leveling etc. which can be implemented by the farmer individually and many other items such as check dams, water way, percolation tanks, farm ponds etc. that Can be implemented only through collective action of the farmers.

MATERIALS AND METHODS

Selection of the districts, blocks, villages and beneficiaries were done on the basis of the extent of coverage of National Watershed Development Programme of Government of India. Villages and respondents were selected on random basis. The study was

conducted in two blocks of Kanpur nagar and two of Unnao Districts. Two villages from each block were selected and 20 respondents from each village were selected for the study. Therefore, a total of 160 respondents were selected from eight villages for the study. Data were collected on the basis of item analysis. Extension contact was measured on the basis of five point continuum i.e. weekly,fortnightly, monthly, occasionally and never with the scores of 5,4,3,2, and1. Other responses were measured on three point continuum namely, 'fully participated', 'partially participated' and not participated with a corresponding score of 3,2 and 1. Five items were selected for study of participation in planning stage, eight items were selected at implementation stage, three items at maintenance and six items were identified to access people.s participation in evaluation stage. Data Were calculated on the basis of percentage.

RESULTS AND DISCUSSION

1. EXTENSION CONTACT: The level of extension contact of the beneficiaries has been presented in the following table.

Table-1. Level of extension contact of beneficiaries

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-8	64	40.0
2.	Medium	9-16	80	50.0
3.	High	17-25	16	10.0
	Total		160	100.0

The level of extension contact was medium in case of 50 per cent beneficiaries. However, 40 per cent had low and 20 per cent had high level of extension contact. Therefore, it was found that the extension contract of the beneficiaries needs to be improved , as it has been found low to medium in case of 90 per cent beneficiaries and only 10 per cent had high level of extension contact.

2.involvement At Pre-project Stage: The participation of beneficiaries at pre- project stage i.e., preliminary survey for obtaining information about the general characteristics of the area and related issues, have been studied and presented in the following table:

Table-2. Involvement of beneficiaries at pre-project stage

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-7	112	70.0
2.	Medium	8-14	32	20.0
3.	High	15-21	16	10.0
	Total		160	100.0

The involvement of beneficiaries at pre-project stage has been found to be quite low . Seventy per cent beneficiaries had low level of participation in different activities undertaken at pre-project stage whereas, 20 per cent had medium and 10 per cent had high level of participation. The findings depict low level of involvement of beneficiaries in pre- project activities. The new watershed guidelines suggested for bottom up planning and pre-project stage at crucial stage for initiating bottom up planning (Cohen and Uphoff, 1977). Therefore the findings are in contradiction to what it has been perceived in the guidelines . It may further be stated mainly the views of only few (10 and 20 per cent) being taken up for the planning of the whole area instead of having a common sharing at village/area specific level.

3.Participation at planning stage: The involvement of beneficiaries in the planning of watershed programme was studied and presented in the following table:

Table-3. Involvement of beneficiaries at planning stage

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-8	90	56.25
2.	Medium	9-16	60	37.50
3.	High	17-24	10	06.25
	Total		160	100.0

Table 3 depicts that 56.25 per cent beneficiaries had low level of participation, whereas, 37.5 per cent had medium and 6.25 per cent had high level of participation at planning stage(similar findings were observed by Chandrakanth et al.,1988). The participation level of beneficiaries at planning stage is better to that of participation at pre-project stage. It is concluded that only few people are being involved at planning stage and it is being considered as the representation of all.

4.Participaqtuion at implementation stage:

The involvement of beneficiaries in watershed programme was studied to find out the exact level of participation of farmers in various activities of watershed project . Data is presented in the following table:

Table-4. Involvement of beneficiaries at implementation stage

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-8	72	45.00
2.	Medium	9-17	64	40.00
3.	High	18-24	24	15.00
	Total		160	100.0

The findings indicated that 45 per cent of the beneficiaries had low level of participation in implementation of various activities . However, 40 per cent had medium and 15 per cent had high level of participation at implementation stage. The guidelines issued by Ministry of Rural development regarding NWDPRA clearly laid down parameters for involving people to the extent of having total control over planning and implementation of activities. However, the outcome of this study indicated that the guidelines were not being properly followed.

5..Participation at maintenance stage: Data about the maintenance and aftercare of the activities and assets which had been generated during the watershed programme was collected and presented in following table:

Table-5. Involvement of beneficiaries at maintenance stage

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-3	92	59.75
2.	Medium	4-6	48	30.00
3.	High	7-9	20	10.25
	Total		160	100.0

It is clear from table 5 that the beneficiaries who had low level of participation were 59.75 per cent followed by 30 per cent having medium level of participation and 10.25 per cent respondents had high level of participation (Similar findings were reported by Singh, 1991). The low level of participation at different stages is attributed to the fact that the farmers had not been acquainted of various roles and responsibilities to be monitored in the implementation of the watershed and that is the reason behind little stake in various activities by the farmer beneficiaries.

6. Participation at evaluation stage: Proper mentoring and evaluation is an important aspect of seeking lags in the successful achievement of watershed programme . The involvement of beneficiaries in evaluation of watershed programme was also studied. Data is presented in the following table:

Table-6. Involvement of beneficiaries at evaluation stage

S. No.	Category level	Score range	No. of resp	Percentage
1.	Low	0-6	100	62.50
2.	Medium	7-12	45	28.125
3.	High	13-18	15	9.325
	Total		160	100.0

It was found that 62.5 per cent beneficiaries had low level of participation followed by 8.125 per cent medium and 9.375 per cent had high level of participation at evaluation stage of the project. The study showed that the participation at different stages of project was low in case of most of the beneficiaries (similar findings were observed by

Kusumanjali,1994). This is because of the reservation on the part of project implementation team in making farmers' aware of rules and responsibilities they had given to share in the project.

REFERENCES

1. Banki Evan, S. (1981). Dictionary of Administration and Management. Systems Research Institute, Los Angeles, California, USA:533
2. Chandrakanth,M.G.; Romm Jeff, J.K.Gilles and Despande, R.S.(1988). Public choice analysis of a watershed programme in India. Paper presented in XXth international conference of Agricultural Economics. Buenus Aires, Argentina, August 26 to September 2.
3. Cohen, J.M. and Uphoff, N.T.(1977). Rural development participation, concepts and measures for project design, implementation and evaluation, monograph no. 2, Cornell University Rural Development committee, Cornell:137.
4. Kusumanjali,P.(1994). Participation of Tribal Women in International Fund of Agricultural development funded Integrated Tribal Development Agency Programmes. An unpublished M. Sc. Ag. Thesis, APAU, Hyderabad.
5. Singh, Kartar(1991). Determinants of people's participation in Watershed Development and Management. An exploratory case study. Indian Journal of Agricultural Economics,46(3):278.

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CORAL REEF : THEIR IMPORTANCE, THREATS AND CONSERVATION STRATEGIES

Hari Prasad, A.Y. Desai, G.S. Temkar and Neelmani
Department of Fisheries Resource Management
College of Fisheries, Junagadh Agricultural University,
Veraval - 362 265, (Gujrat), India

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ABSTRACT

Coral reefs were one of the most important ecosystem throughout the world ocean. They provides food as well as shelter to the aquatic organisms, apart from that they also useful to human beings as fishing grounds, provision of raw material for lime, calcium carbonate, for tourism, for scuba diving like activities etc. But presently, the changing climatic conditions and more of the human interference causes large amount of coral destruction throughout the world. Considering the Indian coast there were mainly four major areas where corals were available and there were three major reef types were occursi.e. atoll, fringing and barrier. The present review article describes the importance of coral reefs, with the major threats to them and conservation and management strategies should be applied.

Keywords : Coral reef, importance, threat, conservation.

INTRODUCTION

Coral reefs provides the great tropical community so that they called as "The Rain Forest of The Sea". Coral reefs represents beautiful structures and contributes to only one percent coverage of the earth surface, but then also they provides habitat for the majority of marine animals. The majority of reef building corals is found in tropical and subtropical waters and typically occurs between 30° N and 30° S latitudes. Coral reef structure is made up of calcium carbonate having association with small zooxanthellae, which provides all of the energy and beautiful coloration to coral polyps. Corals were majorly available upto 100 m depth where sunlight can be easily reached and this is helpful for photosynthetic zooxanthellae(Subha, 2013). Corals were grouped under class Anthozoa of phylum Cnidaria which forms coloniesand also forming the different shapes by secreting the calcium carbonate.

Along Indian waters the estimated area under coral coverage is 2,379 sq. km. There were 227 species under 71 genera and 12 families were reported from Indian waters (Venkataraman, 2011). Many more coastal countries throughout the world like the Maldives, India,

Sri Lanka etc. were depends on the coastal resources such as corals, because they provides a good tourism business as well as fishing resources(Raghuramanet al., 2013).

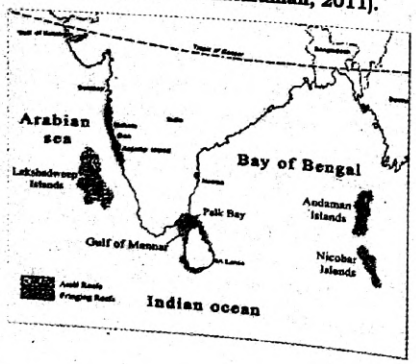
Indian Coral Reefs Diversity

Majorly coral were found in four areas of India; Gulf of Mannar (Tamil Nadu), Andaman and Nicobar Islands, Lakshadweep Islands and Gulf of Kachchh (Gujarat). There were some of the coral patches also reported along the banks of Maharashtra, Kerala and some part of the east coast. Along coastal region of India, coral reefs provides livelihood and social welfare to the coastal communities wherever the reefs were available. They provides up to 25% of the total fish catch from the available area (Rajasuriyaet al., 2002).

Indian Coral Reef Fisheries

There was not more importante was given to the coral reef fisheries in India, because this fisheries was not done up to the commercial level. The local coastal fisherman community only doing fishing for their daily food as a subsistence fishery. The major species which were contributed to coral fisheries were; snappers, groupers, emperors, breams, barracuda, jacks, sprats, herrings and flying fish. There is also reported reef fisheries for sea horse, sea cucumber and sacred chanks (Rajasuriyaet al., 2002).

Fig. 1.Major coral reef areas in India(Source: Venkataraman, 2011).



In Gulf of Mannar specific information about reef fishing is not available, but the demersal fishes were majorly contributed to the reef fishery. In Andaman and Nicobar Islands, Andaman contributes majorly to the reef fisheries than that of Nicobar. The main species targeted include sardines,anchovies, carangids, mackerel, mullets, perches, sharks and rays, catfish, pomfrets, silverbellies and catfish.Along Lakshadweep Island majorly reef fishing is done at subsistence fishery level. The local fisherman majorly targeted to offshore pelagic fishes like tuna etc. and till now there was no any fishing information or data was reported from the Gulf of Kachchh.

Coral Importance To Human Beings

Geologists mostly use corals to judge climatic and environmental conditions. The fossilized corals are used for radioactive carbon dating to know the changes in sea levels and physical parameters of the water quality. Research says that coral compounds were very much important in the field of medical, they can be useful for the treatment of cancer, AIDS, pain, other anomalies and also in various bone surgeries. As corals were colorful in nature they are majorly demanding in the ornaments and high values jewelries. They also useful in aquaria because of their colorful nature. Corals were also acts as good source of calcium carbonate and lime which is useful as raw material for various human required construction activities.As demand of corals was increased the concept of coral culture is came forward, in which primarily researchers, scientists, ornamental traders and businessman were done culture of corals for their trade and fulfilling their passion of aquaria (Subha, 2013), which was helpful to minimize the coral degradation due to human interference.Apart from fisheries, coastal communities were also depends on coral reefs for food and livelihood security. The tourism activities such as snorkeling, scuba diving like

practices were provides good economic support to the coastal population of many more coastal countries. Besides this coral reefs also protects the coastal boundaries from storms and waves, they also protects the nursery, breeding grounds of various aquatic communities like fish, shell fish(Cabral and Geronimo, 2018).

Threats To Coral Reefs

At the present various researchers proved that nearly 60% coral population is at risk and about 80% population under category of endangered due to human interference in Southeast Asia (Wilkinson, 2008). The predictions of studies also stated that up to 2030, if climatic and human interference ratio is going on the same level then nearly about 90% of worlds coral reefs may get destroyed and till up to 2050 it will came under the extinct category (Kleypaset al., 2006; Burkeet al., 2011).

Throughout the world about 60% coral reef structure were in danger due to human induced destructive activities, climate change effects etc. (Sarojet al., 2016). The human induced activities like coral mining, agricultural and urban runoff, pollution, overfishing, blast fishing, disease and canal preparation threaten to the coral ecosystems, along with changed climatic features like sea temperature rise, sea level rise and pH changes (oceanacidification) also creates problem to the coral ecosystem. As like climate and human interference, the natural calamities also plays major role in coral destruction, which includes siltation, cyclone, local tectonic upheavals, tsunami,pests and predators and EI Nino(Pillai, 2010; Subha, 2013).

Coral Reef Conservation And Management Strategies

Coral reef has been protected under the Wildlife Protection Act (1972) and Environmental Protection Act (1986) within Coastal Regulation Zone Notification, 1991). But there was even no separate legal support was provided for coral conservation. The State forest department, fisheries departments and recently the state coastal management authority at the state level are taking up the responsibilities for coral reef conservation in India (Sarojet al., 2016).

As already discussed above corals were most valuable resource to the human beings, but currently it was reported that majority of coral species wereirreparably exploited. Corals were useful in many more fields, such as they provides protection from wave action, having medicinal value, living and feeding habitat to the fishes, crustaceans, oysters, mollusks etc., pharmacologically importance, also provides raw material for lime, cement, calcium carbonate, they were building blocks of atolls, excellent sites can also be useful for tourism as well as scientific research, diversity rich sites also useful for skin andSCUBA diving and sport fishing. And so due to all these mentioned values coral reefs have to be protected and conserved for future generations, for this reef utilization at sustainable level and important management strategies implementation was required (Pillai, 2010). For conservation of coral reef ecosystem major management areas were establishment of Marine Protected Areas where large number of species diversity was reported, the pollution load at the coral diverse site should be avoid or try to minimize, apart from these management strategies people's awareness is very much important regarding importance of coral ecosystem to human beings, also support and conduct the programmes which involves removal of crown-of-thorns starfish (predator of corals), the coral planting and artificial coral reproduction, etc. If considering the existing situation presently peoples were gets aware about the importance of this naturally available gift to human beings, so they started to orient their efforts towards the preservation, conservation and restoration

of coral reefs, various laws with rules and regulations were gets established, some laws were gets reformed, many schemes and conservationprojects have also been initiated in non-tropical countries for growingcorals (Subha, 2013). All this things all-together will helpful for coral reef structure to redevelop their population throughout the globe, which will useful for future generations and sustainable development of coral reefs.

CONCLUSION

As per the above discussed information one can be say that coral reefs were the most productive and principle source of nutrient as well as habitat for coral reef associated organism. They provides food as well as shelter to the all aquatic organisms. But now-a-days due to changed climatic conditions the reef structures were going to damage as coral bleaching, vanishing of corals. The human activities such as fishing, tourism, harvesting for calcium carbonate, lime as raw material etc. also causes the serious damage to the coral ecosystem throughout the world. So it becomes necessary that more investment and improved management strategies were required to protect coral reef ecosystems and increase their ability to survive. Presently, as conservation and management point of view it's become necessary to adopt new technology for coral reef conservation and management. The newly developed technologies such as coral transplantation, MPA development, cryopreservation etc. were useful for sustainable development and future prospect of the coral and coral associated organism.

REFERENCES

1. Burke, L., Reytar, K., Spalding, M. and Perry, A. 2011. Reefs at Risk Revisited Executive Summary, World Resources Institute. pp. 1-18.
2. Cabral, R. B. and Geronimo, R. C. 2018. How important are coral reefs to food security in the Philippines? Diving deeper than national aggregates and averages, Marine Policy 91: 136-141.
3. Kleypas, J.A., Feely, R.A., Fabry, V.J., Langdon, C., Sabine, C.L. and Robbins, L.L. 2006. Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers: A Guide for Future Research, Report of a workshopheld 18–20 April 2005, St. Petersburg, FL, sponsored by NSF, NOAA, and the U.S. Geological Survey, 88 pp.
4. Pillai, C. G. 2010. A review of the status of corals and coral reefs of India, Indian Journal of Animal Sciences 80(4): 53-56.
5. Raghuraman, R., Raghunathan, C. and Venkataraman, K. 2013. Present status of coral reefs in India. In: Ecology and conservation of tropical marine faunal communities. Springer, Berlin, Heidelberg, pp. 351-379.
6. Rajasuriya, A., Zahir, H., Muley, E. V., Subramanian, B. R., Venkataraman, K., Wafar, M. V. M., Khan, S. M. M. H. and Whittingham, E. M. M. A. 2002. Status of coral reefs in South Asia: Bangladesh, India, Maldives, Sri Lanka. In: Proceedings of the Ninth International Coral Reef Symposium, Bali, 23-27 October 2000, 2: 841-845.
7. Saroj, J., Gautam, R. K., Joshi, A. and Tehseen, P. 2016. Review of coral reefs of India: Distribution, Status, Research and Management, International Journal of Science, Environmentand Technology 5(5): 3088–3098.
8. Subha, G. 2013. Environmental and Ecological Importance of Coral Reefs: A Review, International Research Journal of Environment Sciences 2(7): 85-86.
9. Venkataraman, K. 2011. Coral reefs of India. In: Encyclopedia of Modern Coral Reefs. Springer, Dordrecht, pp. 267-275.
10. Wilkinson, C. 2008. Status of Coral Reefs of the World: Executive Summary. Global Coral Reef Monitoring Network. pp. 5-19.

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ORGANIC AMENDMENTS : A NATURAL FERTILIZER FOR SOIL - BORNE FUNGAL DISEASES OF VEGETABLE CROPS

Rashmi Pant and Lalita Sharma
Department of Botany , Govt PG College, Kota , Rajasthan - 324001, India

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ABSTRACT

Many vegetable crops are affected by Soil- borne fungal diseases, which is unacceptable for farmers. Basically Soil-borne diseases are caused by micro-organisms that survive and affects the fertility of the soil. It can be the most frustrating of all the problems which are susceptible to plants . The Indian farmers can think they are doing everything right and yet their plants become sickly, stunted and near death. Many control measures are applied by farmers on the infected plants , but it results unsatisfactory to them. On the flip side , there is another control measure which is eco-friendly and would be applied by the farmers i.e. by using organic amendments to improve the capacity of soil and to support plant life within the same field. It is something with organic compounds that farmers need to add to the soil. In simple terms, it is decaying plant or animal product which includes compost, green manure, dead leaves and animal manure. Undoubetfully, it improves texture of the soil , enhance the soil's physical properties and also provide some additional nutrients to the soil.

Keywords : Eco- friendly , soil-borne diseases , nutrients , control measures , compost

INTRODUCTION

Soil-borne fungi are microscopic plant-like cells that grow in long threadlike structures i.e. hyphae which collectively make a mass called mycelium. The mycelium absorbs different nutrients from the roots of soil. It produces special hyphae that create the reproductive spores. Some well known soil borne fungi such as Fusarium, Phytophthora, Rhizoctonia and Pythium which penetrate into the plant and decompose the living tissue, make it weak, nutrient deficient plant, and finally death (Waksman SA).

Soils contain diverse communities of

microscopic organisms that are capable of damaging plants. A detrimental interaction between a soil organism and plant is often highly specific. The soil organisms that have the potential to be plant pathogens include fungi, bacteria, viruses, nematodes and protozoa. Some pathogens of the above ground parts of plants (leaves, stems) survive in the soil at various stages in their life cycles.

Soils with high biodiversity have been shown to suppress soil-borne fungal diseases. Of all the problems plants are susceptible to, soil-borne diseases can be the most frustrating. The farmer can think they are doing everything right and yet their plants become sickly, stunted and near death.

Soil-borne diseases are caused by pathogens that survive in the soil. Many farmers use harmful chemicals for eradication of these pathogen . Hence, directly or indirectly invite many health problems including infection , hypersensitivity disorders and toxic effects. Apart from this, there is another method for cure which is biological and eco-friendly i.e. by using Organic Amendments.

Organic Amendments : An Exploration

Organic matter is something with organic compounds that you add to the soil as amendment.

Organic Matter + Organic Compounds = Organic Amendments

Organic amendments are materials that worked into the soil to enhance the physical properties of soil . A good soil is ideal for growing plants; nutrient rich , well draining with long water holding capacity for plant roots to access it. Organic amendments are elements added to the soil, such as natural fertilizer for example, compost, peat moss, manure, which improve the capacity of soil and support plant life.

While chemical fertilizers or inorganic fertilizers , are manmade enhancers which is used to raise the level of nutrients found in soil (Gadd GM). They are manufactured synthetically from inorganic sources and then applied to soil in the form of chemical fertilizers. Enormous use of chemical fertilizers causes groundwater contamination that brings environmental issues , acidification of soil and mineral depletion of the soil . Chemical fertilizers adversely effects the health of micro-organisms. Over application of chemical fertilizers to plant causes leaves to turn yellow and brownish , which cause plant to die .Indirectly, results a huge decline in crop yield. (Karmelreetha, A and Jeevika, K)

In other words, Organic amendments is decaying plant or animal material which most commonly includes compost, green manure, dry leaves, and animal manure. As we know , decaying material may not like a beneficial thing to have in field, but the decomposition process improves the soil in several ways. Meanwhile, compost enhances the ground in which you plant both through adding nutrients and through improving texture and help soil to retain water better.

Necessity for using Organic amendments

There are many reasons Organic amendments might be recommended for fields. But the most common are to improve the soil's texture and to correct the soil pH. Organic amendments can change pH of soil .

Organic amendments are materials which are worked into the soil to enrich the physical properties of soil . Fertile and healthy soil is the key of every successful field and ideal for growing plants; rich in nutrients, well draining while still holding water. It is well known that Manure is organic in nature and good for plants growth.

Application of manures i.e. plant debris (oil cakes, dry leaves, decayed plant parts etc.) and animal debris (i.e. cow dung, urine, meal etc.) increases the fertility of soil .

a) Improving Soil texture

Generally soil is low in organic matter, necessary for the structure, water retention and life for plants. Organic matter contains compost, composted manure, peat moss, coir, leaf mold and any other plant or animal waste products. This may not seems that something that would be good for fields, but organic matter can quickly change the texture of your soil as well as encourage beneficial organisms which helps in increasing the soil fertility.

b) Adjusting Soil pH

Soil pH needs to be within a range that will allow plants to access the nutrients in the soil. Some plants prefer a slightly acidic or alkaline soil and many require a soil in the neutral range of about 6.5 to 6.8. By adding organic amendments to soil can adjust the pH of soil. The pH of the soil needs to be within a range that will allow plants to access the nutrients in the soil. Ideally soil pH should be tested every year.

c) Maintenance of proper acidity and alkalinity of soil

Acid and alkali soils are not suitable for the cultivation of all crops. In acid soil, iron, aluminium and manganese remain in unavailable form. It is essential to reclaim the acidity and alkalinity of soil to maintain the fertility of soil. Lime is applied for reclamation of acid soil and gypsum is applied for the reclamation of alkali soil.

d) Ongoing Adjustments

Ongoing adjustments means we will have a better sense of what amendments our soil will need, whenever possible and the easiest way to do by using kitchen extracts like vegetable and fruits peelings , used tea leaves etc . It is a good start and it's free of cost too. These materials not only add nutrients, but they will encourage a balanced ecosystem that will keep the nutrients and soil pH in check, while they improve the texture and drainage of the soil.

Organic Amendments : Natural Boon for Soil fertility

Maintenance of soil fertility is a great problem to our farmers. Regular cultivation of particular crop year after year in the same field decreases the soil fertility. To increase the soil fertility, it is necessary to check the loss of nutrient and to increase the nutrient content of soil.

The following things must be properly followed for increasing the fertility of soil.

a.) Proper use of land improve soil fertility

Production of crop is not possible if we cultivate any crop in any land. So it is necessary to select the crop which is suitable for a particular land. The crop should be cultivated on the basis of the nature soil. For example, cultivation of paddy is best suited in low land clay soil.

b.) Crop rotation improves soil fertility

Crop rotation is a very important practice, especially for soil-borne disease control. For many soil-borne diseases, at least a 3-year rotation using a non-host crop greatly reduces pathogen populations. This practice is beneficial for Phytophthora and Fusarium , but longer rotation periods (up to 5–7 years) may be needed.

c.) Control of weeds help improving fertility

Weeds compete with crop plants for water, space, light and mineral matter. Weeds grown on a particular land absorb the plant nutrient and make the soil unfertile. For this, to maintain and improve the soil fertility, it is necessary to control the weeds in times.

d.) Maintenance of optimum moisture in soil

Optimum moisture in the soil is essential for the proper growth of crops. The quantity of soil moisture in more or less amount hampers the growth of crop. Excessive water in the soil causes the losses of nutrient b leaching and as a result, the fertility of the soil decreases. So it is essential to conserve the soil

moisture which is helpful in the conservation of soil fertility.

e.) Control of soil erosion

Some of the nutrient especially nitrogen, remains on the upper layer of the soil is removed by in any means, the fertility of the soil decreases. So it is essential to conserve the soil moisture which is helpful in the conservation of soil fertility.

f.) Removal of excess water

Removal of excess water from the soil is very much essential. Otherwise, nutrients are lost by the process of leaching. Besides this, aeration is also inhibiting the microbial activity and mineralizations of nutrients do not take place properly. So it is essential to remove excess water from the soil to maintain soil fertility. (Balaganesh B., Muthukrishan R and Pradeesh Kumar T)

Importance of Organic Amendments for plants

Organic amendments contain fewer amounts of nutrients. So we should apply such natural fertilizer to meet the requirement of plant. Applications of Organic amendments as a natural fertilizer not only increase the fertility of soil but also make it possible to meet the demand of plant through the fertilizer application.

The Major Role of Organic Amendments in soil are as follows -

1) Improves Soil structure - Organic amendments added to soil improves the structure of all types of soils, from gritty sand to heavy clay. It makes sandy soil better able to retain moisture, so that it is there long enough for the plants to take advantage of. It also improves water drainage, in heavy, clay soil. Organic amendment improves soil structure by enhancing the granulation of soil particles. As a result, clay soil becomes porous and aeration and movement of water improved. On the other hand, water holding capacity of sandy soil increases. (Chung, Y.R., H.A.J. Hoitink, and P.E. Lipps)

2) Balance Ecosystem - Another benefit of adding organic material to the soil is that it feeds the microorganisms and insects that make up the balanced ecosystem of the soil. It creates a good environment for all these soil microbes and organisms that work with and enhance a plant's health and growth.

3) Improves Root uptake – Organic amendments contains acids that can make plant roots more permeable, improving their uptake of water and nutrients, and it can dissolve minerals within the soil, leaving them available for plant roots. Organic amendments makes the soil porous and thus help in proper aeration.

4) Provide Nutrients - Organic amendments is the store house of food for the plant. The major plant nutrient namely nitrogen, phosphorus and potassium remain in organic matter and the nutrient releases throughout the year which becomes available to plants .Many organic amendments also provide some additional nutrients to the soil.

5) Improves quality of Soil – Organic amendments improves the quality of soil and helps to keep in balance with nature. We can add it an amendment directly to work it into soil . Also Organic amendments imparts a dark colour of the soil and thereby help to maintain soil temperature.

6) Enhance fertility of Soil - Organic amendments helps to improve and conserve the fertility of soil. Organic amendments serve as a store house of food for the soil microorganism. They make the plant nutrient available to plants.(Lyn Abbott & Daniel Murphy)

7) Minimize the loss of nutrients - The plant nutrients remain in insoluble and complicated state in organic matter. As a result, loss of nutrient by rain water or other natural

agencies becomes minimum . Organic amendments increases cation exchange capacity (CEC) of the soil. Thus it prevents the loss of nutrient by leaching and retains them in available form. Organic amendments increases the water holding capacity of the soil , specially important in case of sandy soil.

8) Organic amendments can increases the availability of phosphorus by locking up the calcium, iron and aluminium which are responsible for phosphate fixation.

9) Organic amendments can increases the buffering capacity of soil. Buffering cheeks rapid chemical changes in soil pH and in soil reaction.

10) Organic mulching helps to conserve the soil moisture.

11) Organic acid released from decomposing organic matter helps to reduce alkalinity in soils.

12) Organic amendments reduces the undesirable properties of clay soil like cohesion and plasticity. It makes the clay soil friable and make it easy for cultivation.

13) Organic amendments reduces the loss of soil by wind erosion and reduces the surface run-off and makes soil water more available to plants.

14) Soil becomes inert without Organic amendments and plant cannot grow well in that soil.

MATERIALS AND METHODS

Organic amendment which is a natural fertilizer , it is surprisingly easy to make. . The basic idea is to stack compostable materials in layers in the compost bin.

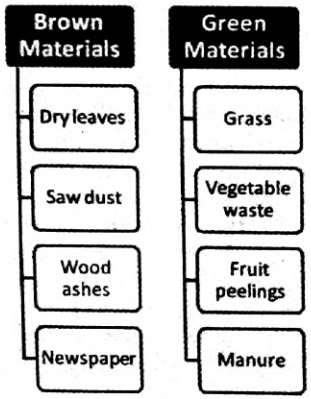
Materials for Compost Bin -

- Wood chips
- Twigs , dry leaves
- Poultry manure
- Seed meals
- Animal manure
- Dried biosolids
- Straw
- Sawdust
- Paperwaste
- Human excreta
- Vegetable matter
- Crop residues
- Wood ashes.
- Newspapers etc

These material are natural and it breaks down or decomposes easily , then it is perfect for compost bin. But not all such materials are created equal. We can use compost manure (from cows, horses, chickens, etc.). In fact, it is often better to use composted , or "aged" manure in the fields than the fresh product. The latter is sometimes so hot that it burns plants. However, it is because it contains pathogens (soil microbes). Now simplify the matter. Basically, in layers, so-called "brown" and "green" materials. The brown materials are the ones with carbon and are tougher to break down.Examples of Brown materials are: Dry leaves ,Sawdust, Wood ashes, Newspapers.

The green materials are the ones with nitrogen. They break down fast and heat up the pile. Examples of Green materials are: Grass left behind after mowing, Vegetable and fruits peelings, Manure.

Methods for making Organic amendments -



After keeping compostable materials in layers in the compost bin , then put the pile adequately watered. A suitable bin whether it is home – made or shop-bought is used . Nature does it all the time but, nature takes a long time for this procedure . As the natural process of compositing generates heat , storing compost in a container enables the heat to be retained more easily and allows breakdown of materials. Compost bin should be covered to retain heat and prevent rain Some moisture is needed which is supplied in the form of moist green grass or green manure .The right mix of materials and the correct amount of watering will put microorganisms to work , to break down the pile. Organic matter depends on the ratio of carbon and nitrogen and degree of composition .Low C:N ratio supplies N to plants and high C:N ratio ties up N by biological immobilization .The pile will heat up, and the materials will decompose naturally.

CONCLUSION

Amending the soil with compost and other forms of organic matter can be viewed as both a problem-solving activity and as part of ecosystem management.

Adding organic amendments , can improve soil no matter what type of soil constitutes the fields. It can solve the problem of, an overly sandy soil that does not retain enough water, or an overly clayey soil that, retains too much moisture.

The organic matter such as cover crop green manure (single and mixed species), seed meals, dried plant material, good quality compost, organic waste, and peats can aid in reducing diseases caused by soil borne pathogens. cropping during the transition periods can enhance soil suppressiveness to damping-off caused by Pythium and Phytophthora; in addition, although compost amendments applied during transition can improve crop vigor by significantly enhancing soil fertility, their effects on soil-borne diseases are not predictable when transitioning to certified organic production.

REFERENCES

1. Balaganesh B*., Muthukrishan R and Pradeesh Kumar T , Methods for improvement of soil fertility (Dept. of SS&AC, Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi - 642 103,Dept. of Agronomy, Tamil Nadu Agricultural University,
   a. Coimbatore – 03)
2. Bissett J and Parkinson D. Functional relationship between soil fungi and environmental in alpine tundra. Can. J .Bot., 1979; 57: 1642-59.
3. Chung, Y.R., H.A.J. Hoitink, and P.E. Lipps. 1988. Interactions between organic-matter decomposition level and soilborne disease severity. Agricultural Ecosystems and Environment. Vol. 24. p. 183–193.
4. Gadd GM. Mycotransformation of organic and inorganic substrates Mycologist, 2004; 18 (2): 60-70
5. Goldstein, Jerome. 1998. Compost suppresses disease in the lab and on the fields. BioCycle. November. p. 62–64.
6. Hoitink, H.A.J., A.G. Stone, and D.Y. Han. 1997. Suppression of plant diseases by composts. HortScience. Vol. 32, No. 2. p. 184–187
7. Hudson, Berman D. 1994. Soil organic matter and available water capacity. Journal of Soil and Water Conservation. March–April. p. 189-194.
8. Karmelreetha, A and Jeevika, K Plant Pathology and Soil science Organic management of Soil borne diseases, Vanavarayar Institute of Agriculture, pollachi, Tamil Nadu

9. Kjoller A, Struwe S. Functional Groups of Microfungi on decomposing ash litter., Pedobiologia., 1987; 30 (1): 151-159
10. Kjoller A, Struwe S. Microfungi in Ecosystems.,fungal occurrence and activity in litter and soil,Oikos., 1982; 39 (3): 389-422.
11. Lyn Abbott & Daniel Murphy. (2003), Soil biological fertility: A key to sustainable land use in agriculture
12. Manickam TS and Venkataraman CR. Effect of continuous application of manures and fertilizers on so physical properties of soil. II under irrigated conditions. Madras Agricultural Journal., 1972; 59: 508-512.
13. Marassas WFO, Burgess WL, Anelich RY, Lamprechi SC, Van Schalkwyk DJ. Survey of Fusarium species Associated with plant debris in South African Soils. S.Ap:J.BoU.54:63-71
14. Mohan , S.K. 1996. Plant Disease Diagnosis and Management, In: Idaho Master Gardener Program Handbook , Parma Research and Extension Center
15. Nagamani A, Kumar IK and Manoharachary C. (2006) Hand Book of Soil Fungi, I.K. International Publishing House Pvt Ltd, New Delhi, India
16. Onnegbu, B.A. (2002). Fundamentals of crop protection, ASCEN, RSUST, Port Harcourt, Pp: 204 -208.
17. Paul, S. and Sainsbuy, D. (1981). Dictionary of microbiology. John Wiley and Son's publication, New York.
18. Schneider, R.W. (ed.). 1982. Suppressive Soils and Plant Disease. The American Phytopathological Society. St. Paul, MN. 88 p. Granatstein, David. 1998. Suppressing plant diseases with compost. Good Fruit Grower. May 1. p. 9–11.
19. Waksman SA. Principles of Soil Microbiology. Williams and Wilkins Co., Baltimore, Md., 1927

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EFFECT OF SEED TREATMENT ON SEEDLING VIGOUR AND MORTALITY OF WILD BAEL (AEGLE MARMELOS L.)

Manoj Kumar Singh* and S.N. Sharma**
Department of Horticulture*
KAPG College, Allahabad-211002, (U.P.), India
Dept. of Plant Pathology**
National P.G. College, Barhalganj, (U.P.), India

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ABSTRACT

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh with a view to standardize suitable stratification duration and hormone concentration for Bael seed treatment. There were seven treatment combinations (T1 to T10) including a control. Different duration of seed stratification i.e., 30hours, 60 hours and 90 hours were tried along with the 100ppm, 150ppm and 200 ppm GA3 seed treatment. Treated seeds were sown in the polythene bags (25x15 cm size, 200gauge thick) containing soil, sand and FYM mixture (1:1:1). It was interesting to note that the effect of stratification duration and hormone treatment concentration was found to be significant for seed germination, transplanting success, seedling mortality percentage and rate of seed germination. Treatment T6 (60hrs+150ppmGA3) yielded highest percentage, (87.00) of seed germination while the lowest percentage value (39.25) was recorded in T9 (90hrs+200ppmGA^3) treatment and the transplanting success was also lowest in T9. The seedling mortality percentage was maximum (80.25) with T9 where as lowest percentage value (23.00) was observed for T6 treatment. It may be concluded that T6 treatment can be recommended for the better stand establishment of Bael nursery.

Keywords : Stratification, treatment, GA^3, nursery, bael , mortality, seedling, germination, seed.

INTRODUCTION

Bael is more resistant to biotic and abiotic stresses. Seedlings of this species have poor buddable size attainability. Their long lasting effect on Bael makes orchard remunerative. Increased demand of Bael buddlings in traditional as well as nontraditional areas of India due to its peculiar character of diverse use, medicinal value ,tolerance to biotic and abiotic stresses ,higher benefit cost ratio and positive government policies emphasized to chalk out some feasible and acceptable measures for the better stand-establishment of saplings at the nursery stage. Bael buddlings are prepared thorough budding on seedling root - stock which is obtained through seeds. In nature, Bael seed has poor germination and higher seedling mortality, owing to adverse edaphic conditions during nursery stage. Therefore it becomes imperative to standardize suitable stratification time and exact hormone concentration for seed treatment for flourishing the Bael nursery-industry. Certainly, these tactics are the most important component to provide sound base for propagation, once time and concentration is standardize, we shall be able to grow healthy seedlings with faster rate.

Keeping these aspects in view, the experiment was under taken to ascertain the effect of the stratification and hormone treatment on seed germination, rate of seed germination, transplanting success and mortality of seedlings.

MATERIALS AND METHODS

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh during the year 2015-16 with a view to standardize suitable stratification duration and hormone concentration for Bael seed treatment. There were ten treatment combinations (T1 to T10) including a control. Different duration of seed stratification i.e., 30hours, 60 hours and 90hours were tried. Soaked seed were put in layers under different strata of moist sand for varying duration. GA3 hormone @ 100ppm, 150ppm and 200 ppm was used for seed treatment after stratification. Treated seeds were sown in the polythene bags (25x15 cm size, 200gauge thick) containing soil, sand and FYM mixture (1:1:1).

Table-1. Effect of stratification duration and hormone concentration on seed germination and rate of seed germination in Bael .

Treatments	Seed germination (%)								*Rate of seed germination*
	3 DAS	6 DAS	9 DAS	12 DAS	15 DAS	18 DAS	21 DAS	27 DAS	*Mean days taken in seed germination*
T_1 (30 hrs+100ppm GA3)	3.95 (10.89)	24.66 (25.29)	[illegible]	50.33 (39.06)	55.66 (42.92)	57.00 (46.12)	58.00 (47.12)	58.00 (47.12)	11.43
T_2 (30hrs+15 0ppm GA3)	4.05 (11.3)	24.66 (27.29)	47.33 (4040)	52.33 (42.06)	60.66 (47.92)	61.80 (51.92)	62.00 (52.12)	62.00 (52.12)	11.25
T_3 (30hrs+20 0ppm GA3)	4.25 (11.30)	26.66 (30.29)	49.33 (424)	55.33 (47.06)	61.66 (50.92)	62.50 (53.12)	63.00 (54.12)	63.00 (54.12)	11.01
T_4 (60 hrs+100ppm GA3)	3.36 (9.83)	27.66 (32.29)	51.33 (464)	57.33 (50.06)	65.66 (54.92)	66.50 (55.12)	67.00 (56.12)	67.00 (56.12)	12.40

Treatments	Seed germination (%)								Rate of seed germination
	3 DAS	6 DAS	9 DAS	12 DAS	15 DAS	18 DAS	21 DAS	27 DAS	Mean days taken in seed germination
T_5 (60hrs+15 0pp mGA3)	4.60 (11.82)	27.66 (32.33)	53.33 (47.76)	63.66 (53.75)	6566 (5450)	66.00 (55.02)	67.00 (55.72)	67.00 (55.72)	12.24
T_6 (60hrs+2 00pp mGA3)	6.63 (14.55)	29.66 (33.64)	59.66 (51.41)	64.00 (51.13)	85.33 (70.91)	86.00 (71.35)	87.00 (72.35)	87.00 (72.35)	12.03
T_7 (90 hrs+100pp mGA3)	3.63 (11.75)	26.53 (35.21)	41.85 (41.44)	45.25 (43.44)	46.25 (44.24)	46.85 (44.52)	47.49 (45.21)	47.49 (45.21)	10.24
T_8 (90hrs+15 0pp mGA3)	3.33 (7.75)	25.53 (32.21)	41.25 (40.44)	42.25 (41.44)	43.25 (42.54)	44.25 (43.04)	45.25 (43.44)	45.25 (43.44)	10.01
T_9 (90hrs+2 00pp mGA3)	3.23 (6.75)	24.53 (30.21)	39.25 (39.44)	39.25 (39.44)	39.25 (39.44)	39.25 (39.44)	39.25 (39.44)	39.25 (39.44)	9.25
T_{10} (control)	3.53 (9.75)	22.53 (25.21)	35.25 (34.44)	45.12 (41.21)	50.00 (43.04)	51.54 (44.32)	52.74 (45.49)	52.74 (45.49)	16.52
C.D. at 5%	2.11	3.34	3.21	2.99	2.85	3.11	3.11	3.11	2.46

Note: figures in parentheses are average transformed value.

RESULTS AND DISCUSSION

Seed germination in Bael started after 3 days of seed sowing and completed within 27 days in all the treatment. Seed germination under different treatments ranged between 39.25 to 87.00 percent. The percentage of seed germination as influenced by treatments differed significantly The maximum seed germination (87.00 %) was recorded in treatment T6 (60 hrs stratification+200 ppm GA3) which was significantly superior to all other treatments and the value was lowest (39.25%) in T9 (90 hrs stratification+200 ppm GA3). The findings of the study supported and corroborated the findings of Bisla et al., (1984) in Ber and Govind and Chandra, (1993) in Khasi Mandrin. The lowest percentage of seed germination obtained with treatment T9 indicated adverse effect of longer duration of stratification coupled with toxic concentration GA3 which augmented seed decay and partial damage of seed too. Over tendering of seed coat and ultra concentration of GA3 might be corroded the plume and radicle of the seed resulting failure of germination. The possibility of exo-osmosis may not be denied. Dewey, (1960); Paliwal & Gandhi (1968) and Ayers and Westcot (1976) also observed the same causes. There was insignificant difference on the rate of Bael seed germination as it was conspicuously influenced by various duration of stratification and seed treatment. However, the faster rate of

Table-2. Effect of stratification duration and hormone concentration on seedling mortality and transplanting success in Bael

Treatments	Seedling mortality (%)					Transplanting success (%)
	28 DAS	35 DAS	42 DAS	49 DAS	56 DAS	
T_1 (30 hrs+100pp mGA3)	13.00 (23.30)	24.09 (33.04)	29.93 (35.91)	36.01 (39.03)	36.01 (39.03)	73.43
T_2 (30hrs+15 0pp mGA3)	12.00 (22.30)	22.09 (31.04)	27.93 (33.91)	31.91 (35.03)	31.91 (35.03)	74.25
T_3 (30hrs+20 0pp mGA3)	11.99 (22.10)	21.89 (30.94)	27.63 (33.81)	31.01 (34.93)	31.01 (34.93)	75.01
T_4 (60 hrs+100pp mGA3)	9.99 (21.10)	20.99 (30.64)	26.66 (32.41)	30.00 (34.13)	30.00 (34.13)	78.40
T_5 (60hrs+15 0pp mGA3)	9.63 (20.55)	20.66 (29.64)	25.66 (31.41)	28.00 (32.13)	28.00 (32.13)	80.24
T_6 (60hrs+2 00pp mGA3)	8.63 (16.55)	18.66 (25.64)	21.66 (28.41)	23.00 (29.13)	23.00 (29.13)	90.03
T_7 (90 hrs+100pp mGA3)	46.63 (40.75)	49.53 (41.21)	51.85 (44.44)	59.25 (53.44)	59.25 (53.44)	48.24
T_8 (90hrs+15 0pp mGA3)	59.33 (52.75)	63.53 (56.21)	66.25 (58.44)	69.25 (59.44)	69.25 (59.44)	38.01
T_9 (90hrs+2 00pp mGA3)	63.23 (56.75)	70.53 (59.21)	78.25 (63.44)	80.25 (66.44)	80.25 (66.44)	34.25
T_{10} (control)	47.63 (40.95)	50.53 (42.21)	52.85 (45.44)	60.25 (54.44)	60.25 (54.44)	64.52
C.D. at 5%	2.32	3.55	3.43	3.90	2.96	4.44

Note: figures in parentheses are average transformed value.

seed germination was recorded in T9 (90 hrs stratification+200 ppm GA3) i.e.9.25 mean days followed by T8 (90 hrs stratification+150ppm GA3) i.e.,10.01 mean days). The slowest rate of seed germination was recorded T10 (control) i.e., 16.52 mean days). Similar results were also recorded by Bahuguna and Pyarelal, (1993) in case of Acacia. There was a noticeable and significant effect of treaments on transplanting success. All those treatments respond poor in seed germination also were poor in transplanting success. Though seeds were sown in polythene bags and gently transplanted into the field.

The differences due to various treatments in respect of seedling mortality differed significantly. The mortality of Bael seedling range between 23.00 to 80.25 per cent within 56 days of seed sowing. The highest mortality was recorded (80.25%) in T9 (90 hrs stratification+200 ppm GA3).followed by 69.25 per cent in T8 (90 hrs stratification+150 ppm GA3) and the value was lowest (23.00%) in T6 (60 hrs stratification+200 ppm GA3) treatment. Similar results were also found by Awang and Hamzah (1986) in Acacia. Bael seed soaking more than 60 houres was proved detrimental in term of seed germination and mortality Therefore soaking hours should not constitute more than 60 hours to achieve better survival of Bael seedlings. Obviously, more leaching had toxic effect of hormone on tender seedlings and higher osmotic pressure, imbalanced nutrient level lead to mortality of the seedlings The findings are in the conformity of the findings of the Sharma et al., (1984) , Gupta,(1989) and Rajamanickam & Anbu (2001).

Based on the result obtained from investigation it can be concluded that seed soaking for 60 hours followed by 200 ppm seed treatment with GA3 resulted best performance with regards to percent seed germination (87.00%) and least seedling mortality (23.00%). of Bael.

REFRENCES

1. Awang, K and Mohd. Basri Hamzah(2006).Effect of potting mixtures and fertilizers on the growth acacia seedlings .Malays. Appl.Biol.,15(1):31-42.
2. Ayers, R.S. and Wescot, D.W.(2006).Water quality of agriculture; irrigation and drainage. Paper. ;29: FAO, Rome,P. 97.
3. Bahuguna, V. K. and Pyarelal (2003) standardize of nursery techniques of acacia Part-II: Indian for. 119:211-216.
4. Bisla, SS. Singhrot, R.S. and Chauhan, KS (1984). Effect of growing media and urea application on seed germination and growth of ber. Haryana .J. Hort.Sci.13(3-4): 118-122.
5. Dewey, D. R.(2000) salt tolerance of twenty five strains of agropyron. Agron J.. 52631615.
6. Govind, S. and Chandra, R.(2004).Standardization of suitable potting media for raising seedlings of Khasi Mandrin. Indian J Hort.,50(3):224-227.
7. Gupta, G. N(2007). Influence of different soil mixtures on nursery growth of some arid zone tree species. Indian For., I 18:952-959.
8. Paliwal ,K.V. and Gandhi,A. P. (1968) anion effect on germination of some jowar and paddy varieties in saline substrate .Indian .j. pl.physiol.11..62-67
9. Rajamanickam, C. and Anbu, S. (2001).Effect of biofertilizer and growth regulators. On Seed germination and Seedling vigour in Aonla Madras agric, J., 88(4):245-247.
10. Shamet,G.S.;Chauhan,P.S. and Sood,R.(2004).Nursery studies on potting mixture on chilgoza pine .Indian. J. For.,17(3)..225-229.

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ROLE OF SOCIAL MEDIA IN AGRICULTURAL DEVELOPMENT

Sheetla Prasad Verma
Department of Animal Husbandry and Dairying
Kulbhaskar Ashram P G College, Allahabad- 211001, (U.P.), India

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ABSTRACT

Social media is the new upcoming medium of technology transfer in the field of various sectors including Agriculture sector. These tools are impacting the agriculture and allied sector too. Social media develops a good platform to agriculture officers, scientist, extension professionals and farmers to exchange their information. Platform like twitter, face book, whatsapp are increasing interaction among users and sharing needed information timely. Earlier farmers used to exchange information and tips of farming when they got together in a meeting place in the village or dependent on the mass media communication like newspaper television, radio etc. but now a day's farmers can access news and spread news by using social media. Farmers have been sharing pictures of their farm, advertising their product on facebook and connecting to experts for any advice or suggestion on whatsapp. These tools are empowering agricultural professionals, farming and farmers. In light of an increasing focus on new demand-driven extension approaches that aim to enhance the adoption of innovative technologies by smallholder farmers, it is needed to analyze the role of the impact of rural social networks on technology adoption. The focus of this paper is to describe the connection between social media (whatsapp and facebook) and agricultural development in India, how agriculture and allied sector development can be enhanced.

Keywords : Social media, agriculture, development, communication

INTRODUCTION

Social media overcomes geographical boundaries and creates communities who share com mon interests. The users also seek out information from traditional media social media platforms. Rhoades and Hall (2007) noted that there was a large presence of blogs covering topics on agriculture.

Social media can define as social network sites as web-based services that enable people to create, publish, share, collaborate, discuss and network through a

wide range of new, mainly digital, formats and platforms(B. B. Balkrishnan and A. A. Deshmukh, 2017).

Boyd and Ellison (2007), defined social networking sites as tools that allow users to create a personal profile of themselves containing information such as their age, location and interest. These personal profiles can then be connected with family, friends and colleagues, where information can be shared among one another. These connections create a network of users where anyone connected to the network can view everyone else's profile and, therefore interact with them

Different types of Social media: Blogs, Microblogs (Twitter), Conversational threads, Social Photos, Social Networking (Facebook, LinkedIn), Video Sharing (YouTube). Metrics on Social A main benefit of social media in agricultural marketing is ability to gain wealth of knowledge and ideas, opportunity to establish key partnership, opportunity to reach wider consumers, experts in agricultural field. Media: Internet, Mobile Phones, Networks. Facebook: People have their own profile brand, pages, groups LinkedIn: Connects with professionals, share information related or becomes a resources (Chidi Ukomadu).

Social Media in Agriculture

Whatsapp

Whatsapp Messenger is a cross platform messaging app which allows user to exchange massages, audio, video photographs. This can downloaded to a smart mobile phone with internet data access. Over one billion peoples using whatsapp to stay in touch with friends, colleague and family.

Whatsapp is one of the best and most popular apps all over a world. Anyone who has a Smartphone will definitely have Whatsapp installed, this app got famous because of its simplicity and user-friendly apps. But everything has its advantages and disadvantages so Whatsapp has too.

Use of whatsApp in agricultural development

- Send unlimited messages across the world using Whatsapp for getting information related to agriculture and also can send feedback immediately.
- Send contacts very easily and can be saved as well as with just two steps
- Send audio and video messages up to size up to (approximately) 16Mb
- Send document files up to 100Mb (like PDFs, documents, spreadsheets, slideshows and more)
- Send your location accurately and can be used instantly for starting the trip using Google maps or your phones default map.
- It provides Group chat with a limit of about 256 Whatsapp Members
- It has broadcast list for broadcasting single messages to multiple persons at a time using a single click.
- It has an option for Email Conversation instead of private messaging.
- It provides unlimited voice and video calls for free

Facebook

Face book is a social networking platform accessible through computers and mobile network and currently has over billion accounts globally. Facebook enables users to connect share information through pictures video and chat.

Facebook in transfer of technology

Facebook can be part of communication, education and marketing (Mains et al, 2013). Facebook help the individuals to develop the connection between individuals and the community enhance educational efforts, marketing program. This allow professional to build social network with their clientele on line. Transfer of technology efforts can be enhance through the use of facebook group and pages. The use of facebook allows extension professional to reach a large and diverse audience in caste effective manner.

How To Use Face Book For Agriculture Development

According to L. Murthi et al. Facebook can be used in agricultural development in following manners-

- ✓ Share agricultural information and massages
- ✓ Post photos and videos of activities at the field level demonstration, interaction with farmers and application of technologies.
- ✓ Share and highlights the success stories of farmers.
- ✓ Advertise events, exhibitions, conference, seminar training program and meeting related to agriculture.
- ✓ Popularize government schemes
- ✓ Send alerts in the case of emergencies
- ✓ Encourage farmers and farmer's producers organizations by connection them with agriculture officer and other groups related to agriculture.

CONCLUSION

Social media plays a very important role in development of Agricultural and allied sector Most of the farmers are using mobile phones nowadays with internet and social media applications in it. Farmers are making use of social media for innovative practices; sharing information etc. the most popular social media for sharing information related to agriculture are Facebook, and Whatsapp.

REFERENCES

1. B. B. Balkrishnan and A. A. Deshmukh, (2017).A Study on Role of Social Media in Agriculture Marketing and its Scope. Global Journal of Management and Business Research: E Marketing; 17(2):33-36
2. Boyd, D. & Ellison, N. (2007). "Social Network sites: Definition, History and Scholarship".Journal of Compute Mediated Communication, Electronic edition.
3. Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. Journal of Computer-Mediated Communication;13(1
4. Chidi Ukomadu (2018). The Role of Social Media in Community Development in Nigeria: The Owe Unity Forum (Oaf) Model. Journal of Humanities And Social Science; 23(5) :34-43
5. Ekta Bansal, (2015). Impact of Social Media on Rural India, Ijmrbs, Vol. 4, No. 3, July 2015.
6. http://www.thehindu.com/today-paper/farmer-ask-what-up-onwhatsapp/article6492889 .ece.
7. Lakshmi Murthi , A. Shrinivasacharyulu, P. Sharath Kumar (2017). Harnessing Social Media for Agricultural Development Extension Digest.
8. Mangold, G. W. and Faulds David, J. (2009). Social Media: The New Hybrid Element Of The Promotion Mix', Business Horizons: 52, 357 – 365.
9. Mark Main et al. (2013). Effective Use of Facebook For Extension Professionals. Journal Of Extension. 51(5)
10. Munshi, K. 2004. Social Learning in A Heterogeneous Population: Technology Diffusion In The Indian Green Revolution. Journal of Development Economics 73(1): 185–213.
11. Rhoades, E.B., & Hall, K. (2007). The Agricultural Blogosphere: A Snapshot of New Agricultural Communicators Online. Journal of Applied Communications, 91(3&4), 37- 56
12. Worldbank,(2016). World development report 2016. Enabling Digital Development- Social Media.

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PHYSIOCHEMICAL AND RADIONUCLIEDS ANALYSIS OF GANGES RIVER FROM ALL PRAYAG TO DOAB

Durgesh Nandini Goswami*, Neeti Mishra and Sarita Agrawal*****

Department of Chemistry* and Zoology***

University of Allahabad, Allahabad - 211002, (U.P.), India

Department of Chemistry**,

Bhawans Mehta Degree College, Bharwari, (U.P.), India

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ABSTRACT

Data provide the inter elemental relationship with and to identify the sources (anthropogenic /natural) for comparative purposes, the results can also be used to estimate human-health risk from irradiation due to direct ingestion. The routine monitoring of water can assure the public that the quality of water is adequate. Radionuclids found at different sampling location in BDL so they cause no harm and no risk of the radionuclids consumption to general public depends on various factors including radionuclids concentration present in the drinking water, water ingestion rate, duration of ingestion along with general health of the person.

Keywords : Physiochemical, Ganges, analysis.

INTRODUCTION

The results provide spatial and temporal variation in the activity levels of different parameter of river analyses in sediment and water samples of the Ganges river. River Ganges is considered to be the most pious river of India. That is why its increasing level of pollution becomes a major environmental concern. Data provide the inter elemental relationship with and to identify the sources (anthropogenic /natural) for comparative purposes, the results can also be used to estimate human-health risk from irradiation due to direct ingestion. The routine monitoring of water can assure the public that the quality of water is adequate. The selected area for this study is taken and its comparison with various standards (USEPA, 2000), (AERB), and (WHO, 2011) and to estimate dose due to pollution to general public by the

ingestion of drinking water.(1,2-8) Due to industrial affluent, municipal sewage, household drainage etc. the increasing concentration of different parameters as major pollutant is alarming. The present paper reported the concentration of different parameters. Physicochemical parameters such as temperature, pH, electrical conductivity(EC), dissolved oxygen(DO), total dissolved solids (TDS), major cations e.g. Na^{+}, K^{+}, Mg^{2+}, Ca^{2+} major anions e.g. F^{-}, Cl^{-}, Br^{-}, SO_4^{2-} NO^{3-} , PO_4 and alkalinity were analyzed by standard procedures. The values obtained were compared with the guideline values for drinking water by Bureau of Indian Standard (BIS) and World Health Organization (WHO). From the measured quantities, certain parameters were selected to derive WQI for the variations in water qus Results showed considerable deterioration in quality of water at some of the sites.

MATERIALS AND METHODS

Sampling carried out based on certain specific criteria so that representative sample can be collected. Samples are collected in two season i.e pre-monsoon and post monsoon as Standard protocol.. The collected samples will be processed and logged in the record book according to their date and locations. Water samples were collected from the middle stream of the rivers and approx. 0.5 meter below the water surface A total of 15 water quality parameters were analyzed. Temperature, pH, DO,TDS, and EC were analyzed in situ with the help of portable water analysis kit (GPS Aqua Meter- AP-1000, Aqua Read Ltd, U.K.) and calibration was done at each site before measurement with the help of Rapid Calibration Solution for subsequent analysis. Measurement of major cations and anions were carried out through differential Pulse Anodic Striping Voltametry (DPASV) from the water and sediments of Ganges at different places from the below said locations..

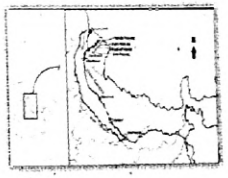
The locations of sampling collection from are shown in Fig. 1.

SAMPLING

- Sampling Time
  - Pre Monsoon July
  - Post Monsoon November.
- Sampling Locations

Allahabad to Nandprayag

1. Allahabad
2. Kanpur
3. Narora
4. Haridwar
5. Rishikesh
6. Devprayag
7. Rudraprayag
8. Kalrprayag
9. Nandprayag



For Radionuclides about 250 g of meshed samples were transferred to a pre-weighed cylindrical acrylic container with dimension of 75 mm diameter multiplied 75 mm, sealed and kept for 30 days to allow for growth of radon gas in order to achieve secular equilibrium between 226Ra, 214Pb and 214Bi in the 238U decay chain and between212Pb, 208Tl and 228Ac in the 232Th decay chain. After attaining the secular equilibrium, the activity levels of 226 Ra, 228 Ra, 40 K and Cs-137 in bottom sediments were measured using Gamma- Ray spectrometry system based on a co-axial high purity Ge detector of 50% relative efficiency and Uranium is detected by LED Flourimetery. For the measurement of parameters, water samples were collected in polyethylene bottles rinsed with 15 % HNO3 (v/v).

RESULTS AND DISCUSSION

Measurement of Gross Alpha & Gross Beta in Water of River Ganges

Location	Gross Alpha (Bq/L)	Gross Beta (Bq/L)
Narora Colony Ghat	BDL	BDL
Narora Barrage	BDL	BDL
Narora Lower Canal	BDL	BDL
Haridwar	BDL	BDL
Rishikesh	BDL	BDL
Devprayag	BDL	BDL
Rudraprayag	BDL	BDL
Kamprayag	BDL	BDL
Nandprayag	BDL	BDL

MDL for Gross Alpha : 0.0074 Bq/l MDL for Gross Beta : 0.041 Bq/l

Radionuclids found at different sampling location in BDL so they cause no harm and no risk of the radionuclids consumption to general public depends on various factors including radionuclids concentration present in the drinking water, water ingestion rate, duration of ingestion along with general health of the person.

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REFERENCES

1. WHO, (2011), Guidelines for Drinking Water Quality, 4th Edition, Volume 1.
2. USEPA, (2000), National Primary Drinking Water Regulation. Radionuclides; Final Rule, United States Environmental Protection Agency.
3. C.P.C.B. , Central Pollution Control Board, Ministry of Environment and forest Ganga
4. Water Quality Trend, Monitoring of Indian Aquatic Resources, Series: MINARS/31/2009-2010, (2009)
5. Status paper on river Ganga, State of Environment and Water Quality. National River Conservation Directorate Ministry of Environment and forests. August (2009)
7. World Health Organization, Geneva, Health criteria and other supporting information.
   Total dissolved solids in drinking-water, Guidelines for drinking-water quality, 2nd ed.
   Vol. 2. (1996)
8. CPCB, Central Pollution Control Board, Ministry of Environment and forest, Water of Environment & Forest, Assessment & Development of Rivers 9. Kuroda P.K., Essien I.O., Sandoval D.N., (1984), Fallout of uranium isotopes from the 1980 eruption of Mount St. Helens, Journal of Radioanalytical and Nuclear Chemistry, 84, 23-32. iver Basin Series:

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DEVELOPMENT : A CONCEPTUAL OVERVIEW WITH THE SPECIAL REFEENCE TO THE SUSTAINABLE DEVELOPMENT

Sujeet Srivastava
Institute of Interdisciplinary Studies
University of Allahabad, Allahabad-211002 (U.P.) India

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ABSTRACT

This paper presents the result of a comprehensive analysis of the concept of development. It explain the level of complexity of the concept that involves variou aspects related to the development. This paper discuss an overview of the concept that are based on the seondary resources. It is an qualitative attempt and approach to understand the concept of developmet. The development process covers a complexity of relationships.Its analysis and disscussion therefore, cannot be restricted only to the economic dimension of the development . Emphasis on this dimension has historic origins, which have already shown the fragility of this approach.

Keywords : development; development indicators; globalizaion; sustainable developmet; index; and well-being.

INTRODUCTION

The concept of development is an multidimensional approache. It is widely made use of various disciplines such as economics, environment, development studies, political science, psychology, anthropology, sociology, etc. Due to its interdisciplinary and transdisciplinary nature its meaning differ to different people as per their diferent perspective.

Meaning of Development

According to Wcbster's encyclopedic dictionary, developnlent means "the act or process of developing: a gradual growth or advancement through progressive changes" (1971: 274). The word development has its origin in an Italian word "Velupara" of the 12th or 13th centuly (Ciangrade 1997:10). It means to unwrap, to disentangle, or toget rid of something. Development is an not ststic and variable concept that transformed in the different stages of tyhe lives among the whole world in the different time scale .

Historical Perspective of Development

The concept of development is almost as old as civilization and it reflect among the people in the different era of historical civilization. The model and meaning of

development has changed before the World Warr Ist, World Warr IInd and after the World Warr Ist, World Warr IInd. The term development reached in this new paradigm, prevailed on concepts such as industialization, modernization and liberalization. In the other word we can say that 17th ,18th and 19th are the era of historical foundation for the development. The the last decades of 20th Century to be nominated here as the era of development. In the 21st Century the Concept of development made an interdesciplinary, multidisciplinary , transboundaries and transcultural approache as the concept of Globalization and Sustainable Development.

Growth and Development

The concept of growth and development are very distictive features and approach as concern of the humans perspectives. These two terms influenced at an hiegher extenct to the way of human develpment. There are many scholars and researcher who have given their idea regarding the process of development and growth.

Development is multidimensional and evaluated (rather than precisely measured) with reference to a host of qualitative factors (Meier 1995:7). Whereas growth is qualitative, development is qualitative as well as quantitative.

The Economic development involves something more than economic growth. Development is taken to mean "growth plus change" (Pandey 1985:94). The main concern of less developed countries is development, while the developed economies can remain concerned with mere growth.

The distinction between growth and development has to be specifically drawn. Growth is no longer a guarantor of 'trickle down" effect. It is now being increasingly recognized in the developing world that there is need for special attention to that group of population which has been left behind in the process of growth.

Improvement in facilities for education, health and general welfare should receive priority over other factors in the development process. In short, econon~icdevelopment without social development is no development at all (Kess 1904:1 1- 13).

All the same social development cannot be achieved without economic development. The two concepts are inextricable so much so that they are intrinsically dependent on each other. In this way we can not find the some basic ingradient and factors that affect the concept of the growth and dvelopment. This is an summarised way to understand the viability of the concept at the present globalized era.

Sustainable Development

The term sustainable development appeared in the late 1970s and was definitely consolidated in 1987 by the aforementioned Brundtland Commission. This commission prepared the most broadly accepted definition of sustainable development: Sustainable development is a transformation process in which the exploitation of resources, direction of investments, orientation of technological development and institutional change are reconciled and reinforces present and future potential, in order to attend to needs and future aspirations (...) it is that which attends to present needs without compromising the possibility of future generations attending their own needs (Becker, 1993, p. 49).

Due to the increase of world political interest in environmental questions and incitement of socialenvironmental conflicts, there has been increased motivation for debate on the theme in the last few decades. As Sachs (2004) argues, it is in this context that the proposal of Sustainable Development appears as a desirable and possible alternative to promote social inclusion, economic well-being and preservation of natural resources.

Although a broad acceptance of the term sustainable had existed in the international community, it is also true that there is no consensus on a clear and unique definition for the concept. From an environmental perspective, the notion of sustainability "originates from theorizations and ecological practices that try to analyze the temporal evolution of natural resources, taking its persistence, maintenance or capacity of returning to a presumed state of balance after some type of disturbance as a basis" (Raynaut, Lana, & Zanoni, 2000, p. 74). According to Raynaut (1997, p. 370), use of this notion could lead to interpreting a history that does not fit in with other behaviour that is not "the immense reproduction of an impossible balance" of nature and society.

CONCLUSION

With the reference of the above mentioned disussion we can now conclude it as a fiding that development is an important ingradient for the human lives now a days apart from the basic need. The global tendency of the people of now a days that the development must be the ultimate discourse for the human lives. It is in this same perspective that Sachs (2004) makes some basic principles of this new developmental vision clear as fallows:satisfying basic needs, solidarity with future generations, participation by the population involved, preservation of natural resources and the environment in general, preparation of a social system that guarantees employment, social security and respect for other cultures and education programmes. Other authors expand the range of analytical dimensions for sustainable development. Darolt (2000) also analyses the question of sustainability, however, adding the sophistication of a division into five sub-dimensions: socio-cultural, technical-agronomic, economic, ecological and political-institutional. In the last but ot the least , we can conclude this discourse with the statement that the humans are the pivot of all the developmet discourse. Without the peapole participation nothing can be sustainable and stable in this era of globalization on our planet.

REFERENCES

1. Almeida, J. A. (1999). A problemática do desenvolvimento sustentável. In D. F. Becker (Org.). Desenvolvimento sustentável: necessidade ou possibilidade. Santa Cruz do Sul: Edunisc. Almeida, P. R. (1994). A cláusula social no comércio internacional. RBCE Comércio Exterior,(40),52-60. Árias, A. R. (1999). Estimativas de indigência e pobreza no Brasil no período 1990-1996: resumo metodológico e resultados. Brasília: IPEA. Beck, U. (1997). Die eröffnung des welthorizontes: zur soziologie der globalisierung. Baden Baden: Nomos. Becker, B. K. (1993). A Amazônia pós ECO-92: por um desenvolvimento regional responsável. In M. Bursztyn (Org.). Para pensar o desenvolvimento sustentável. Brasília: IBAMA/ENAP/Brasiliense. Beckerman, W., & Bacon, R. (1966). International comparisons of income levels: a suggested newmeasure. Economic Journal, 76(303), 519–536.
2. Camino, R., & Müller, S. (1993). Sostenibilidad de la agricultura y los recursos naturales: bases para estabelecer indicadores (Série Documentos de Programas IICA, 38). San José: IICA. 'Castells, M. (2000). A era da informação: economia, sociedade e cultura. São Paulo: Paz e Terra.
3. Diener, E. (1995). A value based index for measuring national quality of life. Social Indicators Research,36(2),107–127. Duchet, M. (1984). Le partage des savoirs – discours historique, discours

ethnologique. Paris: Editions LaDécouverte. Estes, R. J. (1984). The social progress of nations. New York: Praeger. Fundação de Economia e Estatistica. (2003). Índice de desenvolvimento socioeconômico (IDESE). Porto Alegre: FEE.

4. Sunkel, O. (2001). A sustentabilidade do desenvolvimento atual. In: G. Arbix, M. Zilbovicius & R. Abramovay (Ed.). Razões e ficções do desenvolvimento. São Paulo: Editora UNESP & EDUSP. Superintendência de Estudos Econômicos e Sociais da Bahia. (2002). Índices de desenvolvimento econômico e social. Salvador: Author.

5. Trzesniak, P. (1998). Indicadores quantitativos: reflexões que antecedem seu estabelecimento. Brasília: Revista de Ciência da Informação, 27(2), 159-164. Universidade Estadual de Campinas. (2005). Índice DNA-Brasil. Retrieved January 25, 2006, from http://www.dnabrasil.org.br. United Nations Development Programme. (1991). Human development report. New York: Oxford University Press. United Nations Development Programme. (1996). Human development reports 1996. New York:Oxford University Press. United Nations Development Programme. (1999). Human development reports 1999. New York: Oxford University Press. Veiga, J. E. (2005). Desenvolvimento sustentável: o desafio do século XXI. Rio de Janeiro: Garamond. Wackernagel, M., & Rees, W. (1996). Our ecological footprint: reducing human impact on the earth.t. Gabriola Island, BC and Stony Creek, CT: New Society Publishers. World Economic Forum. (1996). Global competitiveness report. Geneva: Author.

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INVESTIGATION OF HYPER CHOLESTEROL AMONG WOMEN PATIENTS LIVING IN UDAIPUR DISTRICT OF RAJASTHAN

Noopur Auddy
Department of Foods and Nutrition
College of Community and Applied Sciences
Maharana Pratap University of Agriculture and Technologies, Udaipur, (Rajasthan), India

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ABSTRACT

Chronic lifestyle-related diseases, such as cardiovascular diseases and cancer, account for millions of deaths each year and are the leading causes of mortality in industrialized countries. Women have higher levels of HDL cholesterol than men because the female sex hormone estrogen seems to boost this good cholesterol but, like so much else, everything changes at menopause. At this point, many women experience a change in their cholesterol levels — total and LDL cholesterol rise and HDL cholesterol falls. In this study to investigate the status of high cholesterol level and consumption food pattern in urban women in Udaipur district, Rajasthan. In this pre-experiential phase collected the information regarding general information, nutritional, biophysical etc. Survey methodology used for this study. Total 50 women were selected for this study who were aged above 40 years. The respondent age percentage were 28% (40-50 years) and 72% were above. 82% respondent were associated with sedentary nature of work and 18% with moderate work. Height and weightof the respondents were measuredusing anthropometric rod and platform weighingscale, which were standardized repeatedly.Result of the anthropometric indices that mean weight of respondent was 73.76 kg, mean height of the respondent was 162.68, mean of Body Mass Index was 27.85 that indicate that all responded were included in obese grade I according to BMI classification and Mean cholesterol level of responded was 220 mg that is included in high in borderline. The diet of respondent in comparison to the balance diet was green leafy vegetables (30.83%), root and tubers (45%), pulses (107.10%), and marginally inadequate in cereals (103.18%), fruits (53.78%), and other vegetable (56.30%) and

adequate in meat and meat product (104.66%), milk and milk product (84.87%), fats and oils (114.4%) and sugar (146.56%). To conclude, prevalence of hyper cholesterol in women is high because of the intake of fat, consumption being high in this sample size. Many factors like food pattern, dietary habits, health habits, and meal times were also affected on women health status. Consumption of balance diet was needed for women for better health.

Keywords : High density lipoprotein (hdl), low density lipoprotein (ldl), body mass index (BMI)

INTRODUCTION

In the industrialized world, a coronary heart disease (CHD) remains a widespread and often untreated disorder despite many advances in prevention and treatment therapies thus it remains a major contributor to mortability and morbidity accounting for a large proportion of public health spending. Globally, WHO currently attributes one third of all deaths to CHD and predicts that the future burden of this disease will shift to include developing nations as they increasingly adopt the behavioral risk factors such as inappropriate dietary practices, low physical activity levels and increased levels of smoking (WHO, 2003).Chronic lifestyle-related diseases, such as cardiovascular diseases and cancer, account for millions of deaths each year and are the leading causes of mortality in industrialized countries. women have higher levels of HDL cholesterol than men because the female sex hormone estrogen seems to boost this good cholesterol. But, like so much else, everything changes at menopause. At this point, many women experience a change in their cholesterol levels — total and LDL cholesterol rise and HDL cholesterol falls. This is why women who had favorable cholesterol values during their childbearing years might end up with elevated cholesterol later in life. Of course, genetics and lifestyle factors can play big roles, too.

About Cholesterol :

It is the main sterol of the human organism. Sterols are a type of natural fats present in the body. Cholesterol is found in our body as part of cell membranes, lipoproteins, bile acids and steroid hormones. The cholesterol in the body has two sources. It comes from diet and it is produced by the body itself. The liver is the main organ producer of cholesterol but, other important organs are also involved in its production, such as the intestine, adrenal cortex, testes, and ovaries. Cholesterol synthesis is partly regulated by the intake of dietary cholesterol. But, as the body can produce its own cholesterol, there is possibilities that people who do not consume excess cholesterol, have some genetic metabolic disorder that leads to hypercholesterolemia.

High cholesterol and heart disease

The body needs a certain amount of cholesterol to work properly. But too much cholesterol in the blood, combined with other fatty substances, and calcium components, will gradually form a plaque. As plaque builds up in an artery, it is gradually narrower and becomes blocked. The artery gets more and more narrow; thus less blood can pass. The artery can also become less elastic. This is called "hardening of the arteries". Some plaques are fragile and can break or rupture. When this happens, blood clots are formed within the arteries. If the clot blocks an artery in its entirety, blood flow stops completely. This is what happens in most heart attacks and strokes.

In this study to investigate the status of high cholesterol level and consumption food pattern in urban women associated with middle income groups in Udaipur district, Rajasthan.

MATERIALS AND METHODS

The survey was conduct between July to December, 2016 among 50 women. The survey was conducted in urban area of Udaipur city, Rajasthan. Total sample size of this study was 50 and the age group of this sample size in the above 40 years.

RESULTS AND DISCUSSION

The present study was conducted to prevent arrest and reverse the forthcoming inception or development of cardiovascular disease by reducing its wide spectrum risk in those who were at an increased risk of this disease in urban areas. The study aimed to evaluate the effects of dietary and life style on major hyper cholesterol risk factors in high-risk subjects without established coronary artery disease or other atherosclerotic disease under following heads:

Interview technique was used for data collection, with the help of well-structured survey Performa. This technique was considered as most appropriate technique to collect in depth information from respondents as there is face to face interaction between respondents and researcher, which facilitate clarification of doubts, if any. Probing was done to get the desired information from respondents. The respondents were contacted individually and interviewed at their residence/office and another place. Collected total 50 samples of women's in different age groups. The respondent age percentagewere 28% (40-50 years) and 72% were above. 82% respondent were associated with sedentary nature of work and 18% with moderate work.

Height and weightof the respondents were measuredusing anthropometric rod and platform weighingscale, which were standardized repeatedly. According this weight and height calculate the BMI status of 50 respondents. Result of the anthropometric indices that mean weight of respondent was 73.76 kg, mean height of the respondent was 162.68, mean of Body Mass Index was 27.85 that indicate that all responded were included in obese grade I according to BMI classification (Garrow, 1981, shown in table 4) and Mean cholesterol level of responded was 220 mg that is included in high in borderline according to table of cholesterol level. In the anthropometric assessment cholesterol level is finding in 50 samples to assessing the severity of hyper cholesterol level. This cholesterol reading were finding through last medical report of respondents.

Table-3. Average Anthropometry of sample size

S.No.	Anthropometry Indicators	Mean
1	Weight (Kg)	73.76
2	Height (cm)	162.68
3	BMI	27.85
4	Cholesterol Level (mg)	220.3

The daily intake of food by beneficiaries was studied using 24 hour recall method for three days to find out their dietary adequacy. The food intake was calculated and expressed as percentage of the balanced diet for sedentary and moderate adult women.

Dietary pattern: The general dietary pattern of the respondents revealed that they usually started their day with tea, parantha, poha followed by lunch which comprised of any seasonal vegetable along with dal, batti were consumed in the day or vice versa. In the evening tea were consumed with some snack like bhujiya, toast, biscuits.

Food Habits: Portrayal of data reveals that 74% of the respondents were non-vegetarians whereas 20% of the respondents were vegetarians and other 6% respondents are ovo vegetarians

Number of meals: Daily meal determines the number of meals consumed by the individual in three days. Data reveals that about 79% respondents were consuming food three times in a day, 17.5% were consuming food two times in a day and rests of the 3.33% were consuming more than three times a day.

Health habits include those habits which directly or indirectly affect an individual's health viz smoking, alcoholism; etc data in table reveal that 12 % respondents were involved in smoking and 10% respondents were involved in alcoholism. Whereas 78% were not consuming alcohol, neither they were chewing Tobacco, nor were they in the habit of smoking.According to food patterns determines the consumption of fat more than 25gm by the individual in three days. Data reveals that mean consumption of fat was 28.60 gm in a single day.

Food Intake: The above results reveal that the diet of women in comparison to the balance diet was green leafy vegetables (30.83%), root and tubers (45%), pulses (107.10%), and marginally inadequate in cereals (103.18%), fruits (53.78%), and other vegetable (56.30%) and adequate in meat and meat product (104.66%), milk and milk product (84.87%), fats and oils (114.4%) and sugar (146.56%).

Table-2. Food Intake of the women respondent

S. No	Food Groups	RDI(g)	Per day dietary intake (gm)	Percentage (%)
1	Cereals	330	340.5	103.18
2.	Pulses	30	32.13	107.10
3	Milk and Milk products	300	254.62	84.87
4	Root & Tubers	200	90.00	45
5	Green leafy vegetable	100	30.83	30.83
6	Other vegetable	200	112.60	56.30
7	Fruit	100	53.78	53.78
8	Sugar	30	44.87	146.56
9	Fats & Oils (visible)	25	28.60	114.40
10	Meat and Meat Products	75	78.5	104.66

CONCLUSION

To conclude, prevalence of hyper cholesterol in women is high because of the intake of fat, consumption being high in this sample size. Many factors like food pattern, dietary habits, health habits, and meal times were also affected on women health status. Consumption of balance diet was needed for women for better health.

REFERENCES

1. Akinoso, R.; Aboaba, S.A.; and Olayanju, T.M.A. (2010). Effects of Moisture Content and Heat Treatment on Peroxide Value and Oxidative Stability of Un-Refined Sesame Oil, African Journal of Food Agriculture Nutrition and Development. Vol.10 No. 10. October 2010.
2. Alipoor,B., Haghihian,M.K., Sadat,B.E., Asghari,M. (2012). Effect of sesame seed on lipid profile and redox status in hyperlipidemicpatients.International Journal of Food Sciences and Nutrition 2012 Vol. 63 no. 6pp.674-678.
3. American Heart Association Meeting Report- Abstract 186 (2012). Sesame and rice bran oil lowers blood pressure, improves cholesterol.
4. Decarterina, R.; Zampolli, A., Del turco, S.' Madnna, R. and Massaro, M. (2006). Nutritional mechanisms that influence cardiovascular diseases, American Journal of Clinical Nutrition 83 (suppl): 421s-426s.
5. Durrington;P.N., Prais; H., Bathanagar; D.(1999).Indications for cholesterol lowering medication, comparison of risk-assessment methods. Lancet 353,278-281.
6. Dunford, N.T. (2001) Health benefits and processing of lipid based Nutritional. Journal of Food Technology (11): 38-44.
7. Fernandes, P.and Cabral, J.M.S. (2006)Phytoesterols: Application and recovery methods. Bioresources technology (2006), doi: 10.1016/j.biotech.2006. 10.006.
8. Mann,J.(2002). Diet and the risk of coronary heart diseases and type 2 diabetes. Lancet 360(9335): 783-789.
9. National Heart, Lung and Blood Institute (NHLBI) (2002): National Cholesterol Education Programme (NCEP). Expert Panel on detection, evaluation and treatment of high Blood Cholesterol in adults (adult treatment panel III) final report. Circulation 106:3143-3421.
10. Nicolosi, R.J., Wilson, R.A, Lawton, C., Handelman, G.J. (2001). Dietary effects on cardiovascular diseases risk factors. Beyond saturated fatty acids and cholesterol. Journal of the American College of Nutrition 20:421s-427s.
11. Ostlund, R.E. (2007). Phytosterols, cholesterol absorption and healthy diets. Lipids 42:41-45.
12. The Internal Task Force For Prevention of Coronary Heart Disease (1998) Coronary Heart Disease, Reducing the Risk. The scientific background for primary and secondary prevention of heart disease, A World-wide review. Nutritional Metabolism Cardiovascular Disease 8.205-271

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A REVIEW ON PERFORMANCE TESTING AND IMPROVEMENT OF HOG PRODUCTION

Sheetla Prasad Verma
Department of Animal Husbandry and Dairying
Kulbhaskar Ashram P G College, Allahabad- 211001, (U.P.), India

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ABSTRACT

This review study was undertaken with the objective to measure the breeding worth of swine either by an individual performance or by a progeny/sibling test. For the testing purpose four test programmes (i) central test programme (ii) on farm test programme (iii) production registry programme and (iv) certified meat hog programme are discussed. Under this a certified meat type sire (CMS) is also discussed as per the study of Carrol, et. al. (1962). After the performance testing of sires mainly all measures of practices of swine farm to enhance production are taken into consideration as per the recommendation of scientific researches. The review study will be useful to increase the production potential of swine farm and for further research as per feed back of breeders.

Keywords : Hog, progeny testing, sibling test, gilt, sow.

INTRODUCTION

The breeding worth of hog can be measured either by an individual performance test or by a progeny/sibling test. The progeny test measures the transmitting ability of the parents. The sibling test predicts the merit of other animals in the litter or herd.

The usefulness of selection depends on the accuracy with which the trait or traits are measured. The measurement of traits like the rate of body Wight gain and feed utilization efficiency can accurately be done with a performance test. For other traits like carcass characteristics the progeny or sibling test is more meaningful as the individual pig being tested must be slaughtered before breeding. However, certain carcass traits like back-fat thickness can now be measured by a live probe or through ultrasonic device on the living pig. In such a case also, a performance test becomes valid. A performance test can also give the desired information for maternal production traits like litter size at farrowing and weaning. A progeny or sibling test, however, is needed to identify sires that can transmit superior traits to their progeny. (Sharda and Yadav-1982)

Testing Programmes.

Two types of programmes have been evolved, viz, central test programme and on-farm test programme. Both the programmes can use either performance or progeny testing or both.

Central test programme: A good example of a central test programme is the Danish system of progeny testing. Danish testing stations were first established in 1907. In this system representative groups of pigs are sent to central testing laboratories by the recognized 'elite' breeders. These pigs are kept under standard environmental conditions. The animals are raised and slaughtered at these centers.

Great importance is given to a favourable proportion between the amount of food ingested and gains made. These are judged again after being slaughtered.

In selecting off springs for these centres, their quality is of great importance. The breeder must keep 2 things in mind while sending young pigs to these central stations: (i) young pigs being tested should be a fair random sample of parent's offspring, and (ii) special precautions are taken to find out pigs that give birth to aberrant piglets. As an example if a farmer gets 8 piglets, 2 of which are abnormal and he sends out of normal piglets after destroying the 2 abnormal ones to the central station, the progeny test will give a different picture. When a boar is heterozygous for some important genes e is likely to produce some aberrant off springs. An important test of a boar's purity and breeding value is to mate him to a number of his own daughters and note the results.

The effectiveness of the Danish testing programme is apparent from the fact that it reduced the back-fat thickness with little change in carcass length of pigs during 1929-70 (Thomson et al., 1972).

On-farm test programme: To avoid the above mentioned difficulties of a central test programme, the animals are tested on the breeder's farm itself. These on-farm test programmes are becoming more and more popular with the breeders. These programmes are partially, favoured by the state or a central govt. but physical facilities are provides on farmer's premises of participating breeders. Thus, a larger number of pigs can be tested under conditions in which pigs are ultimately to live. These programmes involve the following minimum criteria :

1. Litter size : Minimum of 8 pigs alive at 3 or 5 weeks age
2. Litter weight : 48 kg total weight at 3 weeks (or higher in older pigs)
3. Age at 95 kg : 170 days
4. Carcass data at 95 kg
   - Length : 72.5 cm (from 1st rib to aitch bone)
   - Back-fat : 4.0 cm average of observations at 1st, last rib and thickness last lumbar vertebra
   - Loin-eye area : 25.0 cm2 (between 10th and 11th rib)

Production Registry (PR) Programmes

The objective of this programme is double fold, i.e. (i) to increase the growth rate of pigs, and (ii) to increase the prolificacy and mothering ability of gilts and sows.

The advantage of such a programme are (i) the pigs are tested under identical management condition and (ii) close daily observation of pigs is possible.

The disadvantages inherent with this system are : (i) It is possible to test only a few animals and unless the pigs put under test are a good representative sample of the herd from which these have been taken the results of test will not be reliable. (ii) the conditions under which animals are kept may be different from the actual farm condition, and (iii) since animals are from different places, chance of disease problem cannot be completely ruled out.

1. The pig to be tested must be registered.
2. The litter must be nominated within 7-10 days of the birth.
3. Weighing standard to which the pig must

correspond.

Litter weight (kg)		
Age (days)	Gilts	Sow
21	34.0	41.0
35	58.0	65.0
56	125.0	145.0

Litter weight is affected by the milk produced by the sows and this, in turn depends on the feeding of the sow. Sow litters are generally heavier than the gilt litters.

4. In this programme a boar is recognized, if he has served 15 litters each of which is officially PR, or has produced 10 daughters each of which has produced at least 1 PR litter, or has produced 5 daughters each of which has produced at least 2 PR litters.

A PR litter is one which meets the weight and other standard requirement prescribed by the registered agency. A PR boar is one which has sired 15 or more official PR litters and a PR sow is one which has produced 2 PR litters. (D.P. Sharda, 2005)

Certified Meat Hog Programme

The meet hog programme further strengthens the PR programme by the addition of carcass standards like back-fat thickness, length of the body, loin-eye area and lean cut per cent. The requirements for this programme are as follows:

1. Litter must qualify for PR.
2. 2 pigs (preferably a barrow and a gilt) to be slaughtered must weigh 100 kg at 175 days of age.
3. Carcass measurement as prescribed by the respective Association.

A certified meat type sire (CMS) is one which has sired 5 certified litters. Litters must be from 5 different sows not more than 2 of which are full sisters or dam-daughter combinations. A certified mating is the repeat mating of a boar and a sow the have produced certified litters (Carroll et at. 1962)

Measures to improve Hog Production

The fertility of sows and litter size farrowed and weaned are very important factors in determining the viability of a swine project. The cost of raising 6 pigs or 10 pigs from birth to weaning is more or less similar since the maintenance requirement of the sows is the same in both cases.

Breeding and selection alone are not very certain methods of improving the production of swine. Time spent on improving the management of the sow and litter, on increasing the efficiency of feed utilization and the control of diseases and parasites, may contribute more to the income of the enterprise then an equal time spent to increase herd productivity by following complex methods of breeding and selection. This, in any case, is not the justification for neglecting this phase of swine production. However, undue time and energy may not be spent towards this direction.

To ensure that the maximum number of bred gilts and sows farrow large litters of living pigs the following measures are suggested by Cunha (1977).

1. Gilts may be bred to farrow at 10-12 months of age. Gilts should weigh at least 100 kg before breeding.
2. Gilts come into heat during first few days after weaning. When piglets are weaned under 2 weeks of age breed in the second heat missing the first one, when weaned after 3 weeks breed on the first heat.
3. In hand breeding sows are bred twice during the heat period-once when these come into heat and again after 24 hr. In pen mating, a sow may be put with a boar till the heat lasts.
4. The commercial pig may be bred to several boars in the same heat period. 2 boars are run together with the same female in heat or 1 boar for 1 day and second for the next. With this procedure the chances for conception will improve.
5. Though the heritability of litter size is low, selecting for this trait should he continued. In order to increase the litter size by 1 pig, we may have to select pigs for this trait for 20 generations.
6. While selecting the breed for a swine enterprise the litter size must be kept in mind.
7. If old boars are to be used for breeding, one with a good conception rate and with large litters may be used.
8. Both the gilts and sows must be thrifty and in medium condition before breeding, of too fat, the condition may be reduced and if too thin, the condition may be improve.
9. During hot summer months one must keep the breeding and gestating sows cool by water sprinkling or by the use a wallow.
10. For commercial herds, cross breeding is preferred because crossbred mothers give more milk, more pigs survive to weaning, and pigs are heavier at weaning and at market weight.
11. Gilts and sows may be kept in the farrowing stall or pen 5-7 days before due to farrow. Some farmers many like to keep them in the pens for longer periods so that they set used to the pen before farrowing. (Ensminger, 1983)
12. A well trained attendant is needed for farrowing. As soon as newborn pigs are dried after removing membranes, it is made sure they breathe. Overlaying is prevented. Greatest losses occur within 3 days after farrowing, so a close watch on elit sows and pigs must be maintained during that period. The death may be due to starvation (26%), digestive problems (9%), chilling (1%), respiratory problems (2%) and unknown causes (13.8%). (Spotter A, et. al., 2006)
13. The sow is at her best in milk production at about 3 week lactation after which milk quantity is reduced. So a creep feed may be used from 3 weeks till weaning to supplement milk. The ideal weaning weight at 8 weeks age is 15 kg.
14. Pigs are vaccinated for cholera when on sow, if possible, after 4 weeks of age.
15. The farrowing and nursing facilities between groups of females farrowed must be cleaned and kept vacant for at least a week.
16. Space required for gilt and litter is 4.645 m2 and for a sow and litter 5.574m2. (Wilson ER et. al., 1977)
17. The sows and pigs must be put on clean pastures. More than 6 sows and litters per lot may not put on the pasture.

REFERENCES

1. Carroll, W.E. Krider, J.L, and Andrews, F.N. 1962. Swine Production. pp. 38-56. Mcgraw-Hill Book Co, Inc, London New York.
2. Cunha, T.J. 1977. Swine Feeding and Nutrition. Academic Press, New York, London, San Fransisco.
3. Ensminger, M.E. 1983. Animal Science. The Interestate Printers, Publishers, Danville, Illinois, USA.
4. Sharda, D.P. and Yadav, K.R. 1982. Haryana Agric. Univ. J. Res. 12: 380-82.
5. Spotter, A and Distl O 2036. Genetic approaches to the improvement of fertility traits in pigs. The vety. journal 172(2) page 234-247.
6. Thomson, R.M. Prederson, O.K. andn Christensen, A. 1972. Ann. Rept. p 993. Agri Res. Lab. Copenhagen, Denmark.
7. Wilson E.R. Johnson, R.K. and Wettermann, R.P. 1977. J. Anim, Sci. 44: 939-47.
8. D.P. Sharda 2005. Swine production, ICAR pub. New Delhi, page, 81.