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CONTENTS

INTEGRATED MANAGEMENT OF LEAF BLIGHT DISEASE CAUSED BY PHYTOPHTHORA COLOCASIAE RACIB. ON COLOCASIA THROUGH POTENTIAL FUNGICIDES AND BIOCONTROL AGENT UNDER FIELD CONDITIONS

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ABSTRACT

Studies were conducted during kharif 2013 and 2015 to evaluate the effect of corms dip in fungicide, foliar sprays and integration of components for the management of taro blight (Phytophthora colocasiae Racib.). Among the different treatments, Mencozeb 75%WP, Carbendazim 12% + Thiram 63%, Thiram 50WP, Carbendazim 12% + Mencozeb 63% WP (Sixer), Metalaxyl 35%, Metalaxil 8% + Mencozeb 64% (Ridomil), Trichoderma vride an obnoxious proved to be good with significant increase in corm yield and decreased the different disease related aspects. The corm dip in Ridomil MZ @ 0.25% for 1 hour before sowing and two sprays at 10 days intervals of Ridomil MZ individually gave 68.28 and 75.60% control of disease over the unprotected fields, respectively. However, their integrated effects resulted in 90.83% control of the disease thereby given 33.03 and 20.15 additional control of disease over corm dip in Ridomil MZ and two spray of Ridomil MZ alone, respectively.

Keywords: Colocasia esculenta, Phytopthora colocasiae, corms, integration, disease severity (%), C:B ratio.

Colocasia esculental L. is a major food staple and it remains an important crop to many cultural and agricultural traditions worldwide (Ooka and Brennan, 2000). It serves both as a vegetable crop and as a root tuber. The entire plant can be eaten. The corm is eaten fried, boiled, baked, or converted into breadstuffs. C. esculenta is affected by a number of infectious diseases caused by fungi, bacteria, nematodes, viruses and noninfectious or abiotic problems caused by poor soil nutrients. Among all the diseases blight disease caused by Phytophthora colocasiae Raciborski is the most destructive disease responsible for heavy yield losses (25-50%) of colocasia in India (Mishra, 1997; Gadre and Joshi, 2003). In addition this pathogen causes a serious post harvest decay of colocasia corms (Jacson and Gollifer, 1975; Mishra, 1997). It was first reported in india (Butler and Kulkarni, 1913). The disease starts with the onset of mansoon and continues till the end of mansoon. The disease appears as small, water soaked spots that increase in area and eventually spread to healthy plants. Development of few spots on the leaf impairs the marketability and subsequently there is a substantial reduction in corm yield which may exceed 60 per cent in severe cases (Misra and Chowdhury, 1997). The use of chemicals to combat diseases and pests is the fastest method of control and can be used to control fungal pathogens effectively in wetlands. Therefore, it became necessary to research into more effective chemical control strategies with minimal risk to humans and the environment, for the survival and sustainable

production of C. esculenta.

The aim of present investigation to minimize the leaf blight incidence and develop an economically justified and sustainable system of crop protection that leads to maximum productivity of colocasia.

MATERIALS AND METHODS

The field trail was conducted at farmers' field during the year kharif 2013 and 2015 at Baruasagar Jhansi District of U.P. with local highly susceptible cultivar of colocasia. The trail were conducted with recommended package and practices for the crop (Anon, 2001) in randomized block design and replicated thrice. Planting of colocasia corms was done in the first fortnight of June at 10 cm deep with the spacing of 60x45 cm. For the seed treatment trail corms were dipped in suspension of Mencozeb 75 WP, Carbendazim+Thiram (1:2), Thiram, Carbendazim 12% + Mencozeb 63% WP (Sixer), Metalaxil 35%, , Metalaxil 8% + Mencozeb 64% (Ridomil MZ 72WP 0.25%) and Trichoderma viride for one hour before sowing. The corms dipped in water served as check. For the foliar spray seven fungicides namely Mencozeb 75 WP, Carbendazim 50%, Copper oxychloride 50 WP, Metalaxil 8% + Mencozeb 64% (Ridomil MZ 72WP 0.25%), Carbendazim 12% + Mencozeb 63% WP (Sixer), and Thiphanate methyl (Topsin M 70% WP) were evaluated with sticker (Sandovit) @ 1 ml/l against the disease. Integrated effect of corn dip in Ridomil MZ (0.25%) for one hour and two spray of Ridomil MZ at 10 days interval with sticker were also analyze against the disease. The sprays were started just at the initiation of disease or appearance of first symptoms as preventive. Observations were taken on leaf area damage per plant at weekly interval starting from the first appearance of the disease symptom at the end of August till the drying of the shoot in the field. Fungicide-treated and water-treated leaves were scored for disease based on the area of leaves infected by the disease and number of leaves per plant infected by the disease. Lesions per plant, leaf area and number of leaves dead due to disease were also ascertained. Disease severity was computed with the syndrome scale (Horsfall and Cowling, 1978).

$$\text{Disease severity (\%)} = \frac{\text{Area of leaves affected}}{\text{Total area of leaves}} \times 100$$

RESULTS AND DISCUSSION

The result reveal that corms treated with the combination of metalaxil and mencozeb (Ridomil MZ) is found to be effective in controlling the colocasia leaf blight by 68.60% and found significantly superior to rest of fungicide treatments (Table-1). The next best fungicide observed was Sixer (61.80%) followed by Carbendazim + Thiram (59.88). Corms dip in Metalaxil 35%, Mencozeb 75% WP and Thiram was at par in their effect on the disease. Corm dip in suspension of Ridomil MZ and Sixer resulted in maximum crop yield.

To find out the best fungicide for the Phytophthora colacasia management result of the present study indicated that all the test fungicides controlled the disease significantly over the unprotected plots (Table 2).The application of Ridomil MZ used twice as a foliar spray at 10 days interval reduced the disease (75.27%) followed by Sixer (69.51%), gave batter control of disease and Copper oxichloride was found to be least controlling the disease. Disease control with other fungicides ranged between 57.97 to 65.35%.Sprays of fungicides in general gave variable control of colocasia blight with sticker and caused more than 46.29% to 90.48% increase in crop yield.

Table: 1 Effect of seed dressing on the severity of blight of colocasia

S.No.	Name of fungicide	Doses (g/kg corms)	Disease severity (%)	Disease Control (%)	Yield (t/ha)
1	Mencozeb 75%WP	2.5	26.00	54.65	11.10
2	Carbendazim 12% + Thiram 63%	3.00 (1 + 2)	23.00	59.88	11.53
3	Thiram 50WP	3.00	27.33	52.33	10.63
4	Carbendazim 12% + Mencozeb 63% WP (Sixer)	2.00	21.90	61.80	11.97
5	Metalaxyl 35%	3.0	23.60	58.83	11.57
6	Metalaxil 8% + Mencozeb 64% (Ridomil)	2.0	18.00	68.60	13.97
7	Trichoderma vride	5.0	30.20	47.32	10.6
8	Control	--	57.33	00	7.33
	CD at 5%		2.80	3.95	2.41

Table:2 Effect of two spray of different fungicide at 10 days interval on the severity of colocasia blight

S.No.	Name of fungicide	Doses (Kg/ha)	Disease severity (%)	Disease Control (%)	Yield (t/ha)
1	Mencozeb 75 WP	3.0	25.50	57.97	11.30
2	Carbendazim 50%	1.0	21.00	65.39	13.03
3	Copper oxychloride 50 WP	2.0	26.00	57.15	11.06
4	Ridomil MZ 72WP 0.25%	2.0	14.00	75.27	15.40
5	Carbendazim 12% + Mencozeb 63% WP	0.75	18.50	69.51	13.10
6	Topsin M 70% WP	1.2	22.43	63.03	12.40
7	Control	--	60.67	00	7.56
	CD at 5%		3.61	4.06	1.0

Table- 3: Effect of integration of corms dip and foliar spray of ridomil on the management of colocasia blight

Treatments	Doses (g/kg)	Disease severity (%)	Disease Control (%)	Yield (t/ha)	C:B ratio (Cost benefit ratio)
T-1: corms treatment with Ridomil MZ 72WP 0.25%	2.0	18.33	68.28	13.67	4.69
T-2: Foliar sprays with Ridomil MZ 72WP 0.25%	2000.0	14.1	75.60	15.28	4.82
T-3: T-1 +T-2	T1 + T2	5.3	90.83	16.80	5.28
T-4: Check	-	57.8	00	7.20	2.48
CD at 5%		2.90	2.98	3.80	0.80

The corm dip in Ridomil MZ @ 0.25% for 1 hour before sowing and two sprays at 10 days intervals of Ridomil MZ individually gave 68.28 and 75.60% control of disease over the unprotected fields, respectively. However, their integrated effects resulted in 90.83% control of the disease thereby given 33.03 and 20.15 additional control of disease over corm dip in Ridomil MZ and two spray of Ridomil MZ alone, respectively(Table -3). It was also obtained maximum net profit and gave the highest cost benefit ratio (5.28). Maheswari et al (2001) reported the best control of Phytophthora leaf blight of colocasia by application of Ridomil MZ with corresponding increase in corm yield. A direct positive relationship between sprays of Ridomil MZ and percent disease control and that of disease control with corm yield, observed in the present study agrees with the finding of Mishra et al (1996) who have reported a strong positive correlation between disease severity and yield loss. On the basis of above findings, it is concluded that Phytophthora leaf blight of colocasia can be effectively managed and maximum net profit was obtain from the use of corms treatment with Ridomil MZ fallowed by spray of Ridomil MZ after the first appearance of the disease symptom and another Ridomil MZ spray ten days after the first spray.

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EFFECT OF FOLIAR APPLICATION OF CULTAR AND NAA ON MARIGOLD (TAGETES ERECTA L.) CV PUSA NARANGI.

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ABSTRACT

Both plant growth regulators had great influence on vegetative and reproductive attributes of marigold. The effect of Cultar was more pronounced to NAA in reducing growth. All treatments were not better over control. NAA impacts more on vegetative attributes to that of Cultar. Flower generation was greater with NAA to cultar. Interaction effects were found in between to single application. Plant height was maximum (67. 36 cm) in N_3 and minimum (39.49cm) in C_3 while, the maximum branches per plant (18.51) were observed in $C_2N_3$and least (11.02) in C_3. Similarly, minimum and maximum values for leaves/plant (111.01&182.32), roots / plant (11.25&17.14) and tap root length (19.25 cm & 26.22cm) were recorded in C_3 & C_2N_3 respectively. From date to transplanting time taken for blooming was minimum in (59.45) C_3 and maximum (84.45) in N_3. Bloom -flower/plant 17.23 in C_3 & 31.42 in C_2N_3), non-bloom flower /plant (4.05 in C_2N_3 & 10.63 in C_3), flower diameter (4.01 in control & 6.96 in C_2N_3), flower size (23.22 cm2 in control & 29.56 cm2 C_2N_3), bloom-flower fresh weight (8.06 g in control & 10.73 g in C_2N_3) and bloom-flower dry weight (2.95g in control &3.51g in C_2N_3) were also minimum and maximum values for the parameters, respectively.

Keywords : Marigold, IBA, NAA, growth, flowering.

Growth retardants have played major role to suppress the vigor of the plant. Cultar like retardants have ability to modify vigor and orientation of the plant significantly. Genetic potential of plant have never been exploited completely so for. The reason behind this seems that plant phenotype is largely governed by physical environment. Modifications of environmental factors for better yield and quality of economic part of plant have remained a thirst area for researches. Among the tools, agro-chemicals have gained prime position especially for horticultural crop improvement. Marigold plant is well amicable to chemical application. It is grown as an ornamental crop for loose flowers, as a landscape plant, and as a source of pigment for poultry feed. Both leaves and flowers are equally important from the medicinal point of view. Leaf paste is used externally against boils and carbuncles. Marigold is adaptable to different types of soil conditions and thus can be grown successfully in a wide variety of soils. However, a deep, fertile, friable and well drained, soil pH 6.5 to 7.5 having good water holding capacity is the most desirable. Control of flowering is one of the most important practical aspects in application of plant growth regulators especially NAA and cultar hormones to regulate the flowering in ornamental plants Cathey (1964).

Auxin is well known to stimulate the flowering of plants. However, it has been found in various studies that flowering percentage was varied. Two treatments viz., cultar and NAA were tried for performance. NAA was more responsive to increase vigor than cultar. Two

chemicals that is cultar and naphthalene acetic acid (NAA) were found more effective than the naturally grown plant. Today, NAA is still the most widely used auxin for flowering and yield augumentation Murti *et al.*, (2001). It has been repeatedly confirmed that auxin is required for initiation of flowers and adventitious roots on stems. The application of some plant growth retardants, together with auxin, has been used to improve the rooting capacity of cuttings in some species as well as flowering of plant. Plant growth regulators have gained wide acceptance for optimizing the yield of plants by modifying growth, development and stress behavior (Shukla and Farooqi, 1990). Synthetic plant growth regulators, such as auxins, cultar and various other growth retardants when applied exogenously to the plant, influence various aspects of plant development and biosynthesis of its important components (Shukla & Farooqi, 1990; Kewalanand & Pandy, 1998). Marigold requires a mild climate for luxuriant growth and flowering. Marigold seedlings are easily transplanted and established in field without much mortality. At the time of transplanting, they should be stocky and bear three to four true leaves. Nitrogen is responsible to protein synthesis in the plant. Growth is more dependent to protein availability in plant. Cultar suppress the vegetative growth and reserved food make available to the plant. Its foliar application does not causes any injury when applied at proper concentration.

In the present study, the plants of Marigold were treated with plant growth regulators (NAA & cultar). The aim of this study was to test the potential effect of plant growth regulators on the Marigold plants and to select their optimum concentration.

MATERIALS AND METHODS

In this study a local popular cultivar *Basanti Local* of Marigold was used. Two chemicals viz., an auxin Alpha-naphtalene acetic acid (NAA), and cultar (Paclobutrazol) were used for plant growth and yield regulation. Three concentrations of each viz., cultar @ 15ppm, 25ppm and 35ppm and NAA @ 200ppm, 300ppm and 400ppm were used as treatments of each plant separately and in combination, both. Cultar and NAA were applied thrice viz., at 20, 30 and 60 days after transplanting as foliar spray singly. In combination, 5 days interval was given between two chemicals applications. Sixteen treatment combinations were formed. These treatments were compared with the control which did not receive any chemical. The experiment was conducted in Randomized Block Design (RBD) under factorial experiment with three replications. The recommended agronomic practices were applied equally to all the plants in the field. Vegetative parameters viz., plant height, branches/plant, leaves/plant, roots/plant, tap root length, fresh plant biomass and bloom commence time were recorded. Plant height was taken from collar region to the longest branch of canopy. Branches/plant and leaves/plant were counted at flower bud formation. Roots/plant and tap root length was measured after bloom harvest. Fresh plant biomass was taken at full bloom stage. Reproductive traits viz., bloom -flower/plant, non-bloom flower /plant, flower diameter, flower size, bloom- flower fresh weight and Bloom-flower dry weight were recorded. Bloom -flower/plant were considered as those flowers which were able to open from flower buds. Non-bloom flower /plant were those which did not open and remain as flower bud. Flower diameter was recorded at full bloom stage. Flower size was calculated as a multiplication of flower length and width. Bloom- flower fresh weight was recorded at full bloom stage. Bloom-flower dry weight was measured after drying at constant weight. Data were statistically analyzed and conclusions were drawn.

RESULTS AND DISCUSSION

Influence of different concentration of cultar and NAA on vegetative attributes of Marigold:

Plant height, branches/plant, leaves/plant, roots/plant, tap root length, fresh plant biomass and bloom commence time were significantly influenced by cultar treatment. All the parameters were lower over NAA. Higher concentrations were detrimental to lower ones. Dissimilar pattern was observed in NAA treatment. NAA had better results to that of cultar treatment. Interaction effects of cultar and NAA were non-synergistic and yielded variable values for vegetative characters. Plant height was maximum (67.36 cm) in N_1 and minimum (39.49cm) in C_3 while, the maximum branches per plant (18.51) were observed in C_1N_1 and least (11.02) in C_3. Similarly, minimum and maximum values for leaves/plant (111.01&182.32), roots / plant (11.25 &16.14) and tap root length (19.25 cm & 26.22cm) were recorded in C_3 & C_1N_1 respectively. From date to transplanting time taken for blooming was minimum in (59.45) C_3 and maximum (84.45) in N_0. Findings are in conformity with the findings of Saffari *et al.*, (2004) and Mesen (1993). Inhibition in shooting with increased concentration of cultar was recorded by Paul *et al.* (1995), and Ozel *et al.* (2006). Maximum leaf size & leaves per plant were recorded in similar treatments by Sach *et al.*, (1973), Sach & Hackett (1972).

Influence of different concentration of cultar and NAA on reproductive attributes of Marigold:

Reproductive traits viz., bloom - flower/plant, non-bloom flower /plant, flower diameter, flower size, bloom- flower fresh weight and bloom-flower dry weight were studied. All the parameters were significantly influenced by cultar treatment in singly as well as in combination with NAA. Similarly, NAA alone as well as in combination had great influence for reproductive traits. Interaction effects were far better to that of single application. Bloom -flower/plant 17.23 in C_2 & 31.42 in C_1N_1), non-bloom flower /plant (4.65in C_1N_1 & 10.63 in C_3), flower diameter (4.01cm in control& 6.96cm in C_1N_1), flower size (23.22 cm2 in control & 29.56 cm2 C_1N_1), bloom-flower fresh weight (8.06g in control & 16.73g in C_1N_1) and bloom-flower dry weight (2.95g in control & 3.51g in C_1N_1) were also minimum and maximum values for the parameters.

Similar observations were recorded by Farooqi *et al.* (1993) as they reported the same result for Kinetin application on Damask rose in India. Waseem *et al.* (2007) found that the lowest concentration of NAA when used alone, showed its superiority over all the other concentration of NAA by producing the maximum number of shoots per explants, leaves and nodes per shoot. Ali et al. (2005) also reported in Chrysanthemum that an increase of NAA in MS medium resulted in decreasing the multiplication rate. Observations were at par with the observations of Singh and Shrivastava (2007), Singh (2005), Singh and Singh (2003), Tjia *et al.*, (1977).

CONCLUSION

As per treatment growers may be used IBA and NAA together for greater yield and premium quality of marigold flower production. While applying the PGR, variety and season to be taken into consideration.

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Table : 1 Effect of plant growth regulators on vegetative characteristics of marigold plant.

Treatments	Plant height (cm)	Branches /plant (No)	Leaves/plant (No)	Roots/plant (No.)	Tap root length (cm)	Fresh Plant biomass (g)	Bloom commence (Days) (g)
Control C_0	51.33	13.66	120.66	13.66	21.32	515.77	71.63
Cultar15ppm C_1	49.45	14.55	140.36	14.03	22.03	482.65	69.79
Cultar25ppm C_2	45.55	12.04	120.45	12.55	20.55	442.96	65.55
Cultar35ppm C_3	39.49	11.02	111.01	11.25	19.25	384.23	59.45
SEM±	1.02	0.78	2.32	0.79	1.12	4.55	1.84
CD at 5%	2.23	1.54	4.56	1.90	2.56	8.45	3.23
Control N_0	51.26	13.10	130.25	13.19	21.23	512.01	71.56
NAA 200ppm N_1	51.25	15.33	148.64	14.00	22.00	515.41	71.23
NAA 300ppm N_2	56.23	16.21	165.32	16.44	24.32	568.50	76.02
NAA 400ppm N_3	67.36	17.98	169.33	16.63	25.22	660.45	84.45
SEM±	1.01	0.75	2.04	0.78	1.11	4.54	1.74
CD at 5%	2.12	1.45	4.25	1.87	2.45	8.36	3.01
Control C_0	39.22	13.28	130.99	13.85	21.01	356.09	56.02
Cultar +NAA $C_1 N_1$	50.11	14.66	142.23	14.56	22.31	495.01	65.55
Cultar +NAA $C_1 N_2$	52.23	15.45	152.25	15.63	23.42	525.23	79.33
Cultar +NAA $C_1 N_3$	54.33	16.94	163.42	16.61	24.36	530.23	74.03
Cultar +NAA $C_2 N_1$	47.74	12.01	121.41	12.78	20.45	464.02	65.62
Cultar +NAA $C_2 N_2$	48.96	13.12	132.41	13.44	21.55	482.00	67.44
Cultar +NAA $C_2 N_3$	49.55	18.51	182.32	17.14	26.22	689.00	69.45
Cultar +NAA $C_3 N_1$	47.45	13.55	132.11	13.21	21.42	472.33	67.23
Cultar +NAA $C_3 N_2$	49.66	14.65	142.74	14.37	22.23	492.46	69.44
Cultar +NAA $C_3 N_3$	43.88	15.74	152.77	15.11	23.44	432.75	63.52
SEM±	1.01	0.84	3.24	0.89	1.02	4.46	1.23
CD at 5%	2.25	1.58	7.25	1.71	2.51	8.35	2.01

Table : 2 Effect of plant growth regulators on reproductive characteristics of marigold plant.

Treatments	Bloom - flower/plant (No)	Non-bloom flower /plant (No)	Flower dia. (cm)	Flower size (cm^2)20	Bloom-flower fresh weight(g)	Bloom-flower Dry weight(g)
Control C_0	21.20	7.02	4.01	23.22	8.04	3.00
Cultar15ppm C_1	23.02	8.01	5.20	25.01	8.08	3.0 1
Cultar25ppm C_2	19.55	9.36	5.45	26.20	9.06	3.12
Cultar35ppm C_3	17.23	10.63	5.63	27.42	9.07	3.22
SEM±	0.78	0.08	0.12	0.89	0.08	0.05
CD at 5%	1.74	1.01	0.95	1.24	1.02	0.75
Control N_0	21.33	7.85	5.00	23.25	8.05	2.99
NAA 200ppm N_1	25.05	8.01	5.96	26.56	8.07	3.02
NAA 300ppm N_2	27.62	7.00	6.23	27.36	9.08	3.24
NAA 400ppm N_3	29.23	6.02	6.33	28.35	9.09	3.26
SEM±	0.77	0.08	0.13	0.89	0.08	0.06
CD at 5%	1.75	1.01	0.99	1.23	1.03	0.07
Control C_0	21.74	7.00	5.00	23.25	8.05	2.95
Cultar +NAA $C_1 N_1$	23.45	8.00	5.99	26.99	8.08	3.01
Cultar +NAA $C_1 N_2$	25.56	7.00	7.22	28.45	9.09	3.27
Cultar +NAA $C_1 N_3$	27.22	6.02	7.42	28.66	10.05	3.29
Cultar +NAA $C_2 N_1$	19.20	10.23	6.02	28.75	10.02	3.30
Cultar +NAA $C_2 N_2$	21.45	7.01	6.36	27.45	10.05	3.08
Cultar +NAA $C_2 N_3$	31.42	4.05	6.96	29.56	10.73	3.51
Cultar +NAA $C_3 N_1$	22.04	7.22	6.45	28.36	10.04	3.02
Cultar +NAA $C_3 N_2$	23.02	6.22	6.44	28.44	10.06	3.03
Cultar +NAA $C_3 N_3$	25.88	6.23	6.01	28.43	10.01	3.04
SEM±	0.75	0.08	0.08	0.88	0.90	0.06
CD at 5%	1.54	1.02	1.03	1.76	1.03	0.75

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A COMPARATIVE STUDY OF EDUCATIONAL QUALIFICATIONS OF MEN AND WOMEN IN RESPECT TO GENDER INEQUALITY IN RURAL AREA OF SOANBHADRA, IN U.P .

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ABSTRACT

It can be derived from the findings that there remains a difference in the educational qualifications of men and women. It was found that women are stereotyped to do the household chores and not do anything without taking the permission of men. Men are considered superior and they are born to govern or dominate women and this mind set is deeply embedded in the people of this rural area of soanbhadra. Further it can be said though the sample was small yet the findings were strong and they can be generalized to other rural area also. The researcher was able to identify the gender inequality present in the rural area of soanbhadra.

As the gender inequality is widespread prevalent in almost every country of the world so it is important to know how does this gender inequality is impacting the female education universally. Gender inequality and women education is the current trend in the social science research in this era. So it is important to know the current scenario of women education in India. Since the review shows that no study is conducted in the rural places of soanbhadra district that are directly related to gender inequality and its effect on women education in comparison to men education. So, the researcher found it necessary to conduct a study to find out the difference between the educational qualification of men and women of a rural area.

Keywords : Educational qualifications, gender inequality, dominate women, stereotyped, household.

Education is both an intrinsic right and a critical lever to reaching other development objectives. Providing girls with an education helps break the cycle of poverty: educated women are less likely to marry early and against their will; less likely to die in childbirth; more likely to have healthy babies; and are more likely to send their children to school. When all children have access to a quality education rooted in human rights and gender equality, it creates a ripple effect of opportunity that influences generations to come.

Despite progress in recent years, girls continue to suffer severe disadvantage and exclusion in education systems throughout their lives. An estimated 31 million girls of primary school age and 32 million girls of lower secondary school age were out of school in 2013. Sub-Saharan Africa has the lowest proportion of countries with gender parity: only two out of 35 countries. And South and West Asia has the widest gender gap in its out-of-school population - 80 per cent of its out-of-school girls are unlikely to ever start school

compared to 16 per cent of its out-of-school boys. Furthermore, many countries will still not have reached gender parity. On current trends, it is projected that 69 per cent of countries will have achieved parity in primary education, and 48 per cent of countries will have achieved parity in lower secondary education by the 2015 deadline.

Girls' education is essential to the achievement of quality learning relevant to the 21st century, including girls' transition to and performance in secondary school and beyond. Adolescent girls that attend school delay marriage and childbearing, are less vulnerable to disease including HIV and AIDS, and acquire information and skills that lead to increased earning power. Evidence shows that the return to a year of secondary education for girls correlates to a 25 per cent increase in wages later in life.

Barriers to girls' education :

While gender parity has improved, barriers and bottlenecks around gender disparities and discrimination remain in place, especially at the secondary school level and among the most marginalized children.

There are various barriers to girls' education throughout the world, ranging from supply-side constraints to negative social norms. Some include school fees; strong cultural norms favouring boys' education when a family has limited resources; inadequate sanitation facilities in schools such as lack of private and separate latrines; and negative classroom environments, where girls may face violence, exploitation or corporal punishment. Additionally, schools often lack sufficient numbers of female teachers.

Increasingly, adolescent girls also face economic and social demands that further disrupt their education, spanning from household obligations and child labour to child marriage, gender-based violence and female genital cutting/mutilation. Recent estimates show that one-third of girls in the developing world are married before age 18, and one-third of women in the developing world give birth before age 20. If all girls had secondary education in sub-Saharan Africa and South and West Asia, child marriage would fall by 64 per cent, from almost 2.9 million to just over 1 million. Inadequate or discriminatory legislation and policies often inhibit girls' equal access to quality education. In countries such as Afghanistan and Pakistan, formal or written threats to close girls' schools or end classes for girls have fuelled gender motivated attacks on schools.

When compounded by factors such as poverty, disability and locations, such barriers can become nearly insurmountable for girls.

Empowering girls :

Recognizing the opportunities provided through girls' education, UNICEF supports governments in the reduction of gender disparities through interventions at national, local and community levels aimed at empowering girls. Through the United Nations Girls' Education Initiative (UNGEI), we champion the rights of girls and help countries achieve gender equality in education. UNICEF serves as lead agency and hosts the Secretariat of the UNGEI partnership. In addition, we empower girls by supporting life skills-based education and female role models in education. Child-Friendly Schoolspromote gender equality in the classroom by providing an overall gender-sensitive environment that is conducive to learning at all levels.

These varied and multi-layered disadvantages that girls face in education highlight the complex interrelatedness between gender and other disparities, along with the

deep-rooted nature of these inequalities. Girls' access to education alone cannot address these structuralbarriers, which require transformative approaches and strategies that tackle discrimination and power relations between males and females in schools and society at large. In line with the Operational Guidance on Promoting Gender Equality through UNICEF-Supported Programming in Basic Education, UNICEF has shifted towards a more comprehensive understanding of gender equality. This has resulted in an increasingly holistic approach to education that recognizes the importance of power in the inter-dependent relations among families, schools, communities and national governments.

2015 and beyond

As we look towards 2015 and beyond, UNICEF continues to take a more transformative approach to girls' education by tackling discrimination, violence and the exclusion of girls from education. As such, programming in girls' education will focus on the empowerment of girls in tandem with improving their learning and measuring learning outcomes. We are working with partners to move beyond indicators focused on gender parity and focus more on measuring larger progress in girls' education on dimensions of equity and learning outcomes. Furthermore, this emphasis on girls' empowerment will demand even greater attention to social emotional learning and innovation within programmatic approaches in education.

The Indian Experience :

India represents a picture of contrasts when it comes to education and employment opportunities for girls. Cultural, social and economic factors still prevent girls from getting education opportunities so the question of equality is still a mirage.

However, the rural and the urban areas present contrast.

In the rural areas the girl child is made to perform household and agricultural chores. This is one of the many factors limiting girls' education. Cleaning the house, preparing the food, looking after their siblings, the elderly and the sick, grazing the cattle and collecting firewood are some of the key tasks they have to perform. Households are therefore reluctant to spare them for schooling. Physical safety of the girls, especially when they have to travel a long distance to school and fear of sexual harassment are other reasons that impede girls' education. In the urban areas, however, there is a discernible difference in the opportunities that girls get for education and employment. Though the figures for girls would still be low as compared to boys, what is heartening to see is that whenever given the opportunity, girls have excelled more than boys.

For instance, in the Central Board of Secondary Examinations for grades 10 and 12, which are at an All India level, girls have for over a decade now, bagged all the top positions and secured a higher overall percentage compared to boys.

In employment opportunities too, women in India today have stormed all male bastions. Be it piloting aircraft, heading multi-national corporations, holding top bureaucratic positions, leading industrial houses, making a mark as photographers, filmmakers, chefs, engineers and even as train and lorry drivers, women have made it to all hitherto considered male bastions in India.

However, this is not reason enough for cheer. For the number of girls and women who have been left out of education and employment opportunities, still far outweighs those who have got them. And what need to change this scenario, is not just governmental efforts but a

change in societal norms, in cultural and traditional biases and in general mindsets of people. And in this the media, the civil society, and the youth, the women and girls have a lot to contribute.

MATERIALS AND METHODS

In this study, researcher chose the technique according to the topic and the appropriate method of "Survey method" has been used, the population consist of men and women of rural area., the researcher had collected the data from samples at two level, the researcher had collected the data from samples at two level:

After the selection of rural area , the sample of men and women were drawn from the population. Only the men and women of above thirty five years of age were taken as sample for the study.

Table showing the sample from the rural area of soanbhadra :

MEN	WOMEN
20	20

The technique of incidental sampling was used due to paucity of time.

In this study, a self-made interview schedule is used as a tool to collect the data. The tool is divided into two parts:

1. Part 1 is consist of twelve questions to find out the gender inequality prevailing in the rural area of soanbhadra.
2. Part 2 is consist of question with seven points in scale with marking 1-7.

The data collected was treated with appropriate statistical techniques to derive results and test the hypothesis. The statistical techniques used in this study are:

Mean- Denoted by M

Formula: $M = \Sigma X/N$

Where, ΣX = sum total scores of the sample

N=Total number of sample

Standard Deviation- Denoted by 'S.D'

Formula: $S.D = \sqrt{\Sigma x^2/N}$

Where, $x^2=(X^2-M)$, it is the deviation of each score from the mean

N=total number of sample

t-test-t-test was conducted for comparative analysis of scores and to test the null-hypothesis of this study.

Formula: $t=M_1-M_2/SED$ = Difference between means/ standard error of difference between means.

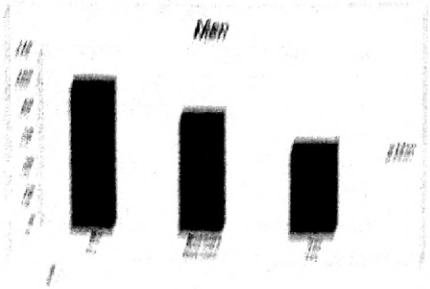
Pooled $S.D = \sqrt{\Sigma x_1^2+x_2^2/(N_1-1)+(N_2-1)}$

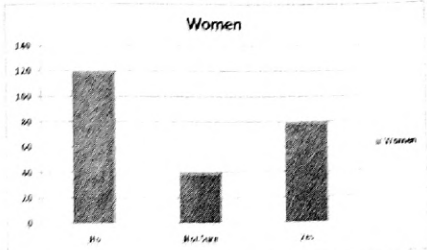
$SED = S.D\sqrt{1/N_1+1/N_2}$

RESULTS AND DISCUSSION

First the classification and tabulation of all collected data have been done for this study and then the statistical analysis was done on the basis of raw scores.Data related to the identification of Gender Inequality present in the rural area of soanbhadrawas collected through the part 1 of the interview schedule.Data related to educational qualifications of men and women were collected through the part 2 of the interview schedule.Data related to the educational qualifications of men and women have been analysed by mean, standard deviation and t-test is 05% level of significance has been used to test the null hypothesis of this study.

To identify the gender inequality in the rural area of soanbhadra.

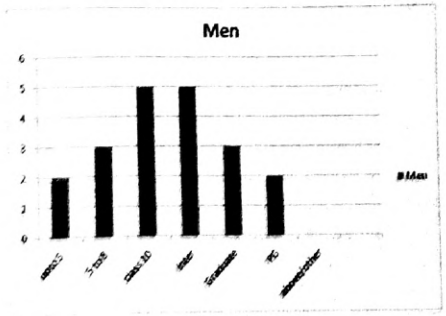




Bar diagrams showing the pattern of responses by the men and women of the rural area of soanbhadra

1. From the above diagrams it can be interpreted that both men and women have responded more 'NO' and 'NOT SURE' than 'YES'. It means that both men and women feels and believe that men are superior to women and women should be subjected to suppression by the men.
2. Men have the feeling of dominancy and in most of the situations they believe that financial matters as well as decisions for home matters should solely be done by them and women should stay at home and take care of household chores. Yes are responded by men who are more educated than the other men that show that the education was helpful in modifying the mind set of these men a little.
3. Women on the other hand have a little different attitude. They are totally submissive as they responded more 'No' than men and more 'yes' than men too. So it can be said that they are supposed to be submissive as they are always taught to be due to the upbringings of their narrow mind set of their families but some personally believe that they should not be kept or treated below par with men, these women with more yes responses are more educated than the previous class of women.

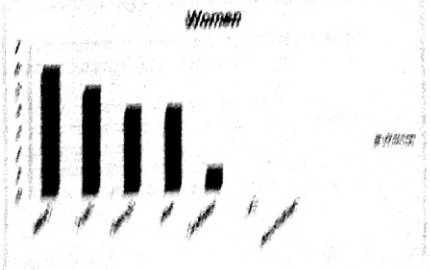
To know the educational qualification of men in the rural area of soanbhadra.



Bar diagram showing the pattern of educational qualifications of men of soanbhadra.

1. Out of sample of 20, it was found that only two men have studied till class 5.
2. Out of sample of 20, it was found that only 3 men have studied till class eight.
3. Out of sample of 20, it was found that only 5 men are educationally qualified till class tenth.
4. Out of sample of 20, it was found that 5 men have passed the inter class.
5. Out of sample of 20, it was found that 3 men have graduated.
6. Out of sample of 20, only 2 men have passed the post graduate level.

To know the educational qualification of women of the rural area of soanbhadra.



Bar diagram showing the educational qualifications of women of the rural area of soanbhadra

1. From the above bar diagram it is clear that out of the sample of 20 women most of the women have studied only up to class 5 that is they are merely literate.
2. The next higher number of women lies in the category of class 5 to 8.
3. Only four women have passed class tenth and Inter examinations.
4. No woman is graduate or post graduate.
5. The bar diagram clearly tells that women education is still not considered to be important and that's why women lag behind men in the field of educational qualifications.

compare the educational qualifications of men and women of the rural area of soanbhadra

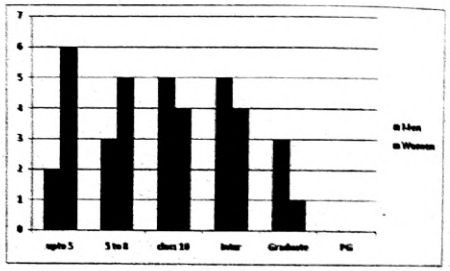
- There will be no significant difference in the educational qualifications of men and women of the rural area of soanbhadra.

	Total Sample	Mean	Standard Deviation	t-test	Degree of freedom	Level of Significance	Significant or not significant
Men	20	3.5					
Women	20	2.5	1.35 pooled	7.407	38	0.05	Significant

From the above table it is found that:

1. The mean scores of educational qualifications of men and women are found to be 3.5 and 2.5 respectively.
2. The pooled standard deviation of the mean scores of educational qualification of men and women is found to be 1.35.
3. The calculated value of t-test for 38 degrees of freedom is 7.407.
4. At 0.05% level of significance, the tabulated value of 38 degrees of freedom is 2.02.
5. So from the above table it is clear that the calculated value 7.407 is much higher than the tabulated value of 2.02 and hence it is significant and thus the null hypothesis can be rejected.

So it can be said that the educational qualifications of men of thee rural area of soanbhadra is higher than that of the women as the t- test is found significant as well as the mean scores of men were higher than that of women. So it is proved that women education is still not considered important and women are left below par than the men in the field of education. Women are supposed to be submissive and men are dominant. It shows that our society is patriarchal.



Bar diagram showing the difference of educational qualifications between men and women category wise.

This bar diagram shows clearly that the women are lesser educated than men.

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NUTRITION SECURITY THROUGH KITCHEN GARDEN

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ABSTRACT

The present study was undertaken with the objective to improve nutrition through nutrition kitchen grading and save their money which spend on procurement of vegetables for their daily diet. A total number of 60 household were surveyed by personal interview method to elicit the information regarding the consumption practices of GLV (Green Leafy Vegetables) and expenditure on it in Washim district. The result revealed that the majority of the surveyed housewives were of middle age group. The literacy level of housewives as well as heads of families was good. Most of them were primary school educated and were from middle income group. After intervention of kitchen garden households save near about 200 to 300 Rs per month and only 3.33 percent people invest their money on purchasing of vegetables. 50% families were consumed vegetables and tubers above 500 g/day and only 8% families were consumed vegetables and tubers between 125-250 g per day.

Keywords **:** Nutrition, Kitchen Garden, Vegetables, Tubers

In rural areas peoples were not aware about balanced diet so generally deficiency of micronutrient is found. The green leafy vegetables and tubers are rich sources of carotene, iron, calcium, ascorbic acid, riboflavin, folic acid and other minerals.(Devdas and Saroja 1980). For adult the consumption of leafy vegetables is 100 g recommended by Indian Council of Medical Research recommended but the actual consumption was found to be 10-20 g which is only 20 present of the recommended requirement (Gopalan et al 1989). Low consumption of green leafy vegetables leads lower intake of vitamins and minerals. As a result majority of population in rural areas suffer from iron and vitamin A deficiency.

Malnutrition is a serious public health problem. It retards child growth, increases the risk and duration of illness, reduces work efficiency, and slows social and mental development. Malnutrition among women of reproductive age increases the risk of mortality during labor and delivery and puts their newborn children at risk of long-term deficiencies. Improving nutritional status, including micronutrient status, can lead to increased productivity, increased child survival and growth, and reduced maternal morbidity and mortality.

Various types of green leafy vegetables are consumed all over the country. However green leafy vegetables are seasonal and available only in particular season. The rural

peoples will get GLV and Tubers in sufficient quantity in their daily diet. It will prevent malnutrition, Anaemia, night blindness which is serious problem in many rural areas (WHO, 2001 and WHO 2004).

A kitchen garden is an integrated system which comprises the family house, a recreational area and a garden producing a variety of foods including vegetables, fruits and medicinal plants for home consumption or sale. The kitchen/home gardens have been found to play an important role in improving food security for the resource poor rural households in developing country (Asaduzzaman, 2011) and can do the same in India. The advantages of Nutrition Kitchen Garden are supply of fresh fruits and vegetables in high nutritive value and free from toxic chemicals. It helps to save expenditure on purchase of vegetables and economize therapy. Vegetables harvested from kitchen garden taste better than those purchased from market. It will prevent malnutrition, Anaemia, night blindness which is serious problem in many rural areas (Bloem *et al.*, 1998)

Therefore, the present study was carried out with an objective to train the housewives for nutrition kitchen garden and to investigate the role of kitchen gardens in addressing food and nutritional security.

MATERIALS AND METHODS

The study was conducted by Suvide Foundation's Krishi Vigyan Kendra, Karda Washim (M.S.). The total number of 60 household covered in the rural areas during 2013 and 2014 and was selected randomly. The housewives of selected household were personally interviewed to elect the information regarding consumption practices of green leafy and other vegetables and expenditure on it.

A questionnaires was formed covering socio-economic status and different aspect of consumption and expenditure on vegetables, awareness of nutrient contents, In addition to that educational status, food habits of selected subject were also include in the questionnaires. The study population is about 60 households who live in the village. According to Small sample technique (Morgan, 1970) a sample would be most ideal at 95 level of confidence. However this puts a very big impact on the cost of the study as to administer the questionnaire alone will require in excess of 4 months having in mind that the workers may only be available for not more than a three hour window when workers are in their houses after work. 60 households were sampled for this study.

To avoid biasness a stratified random sample was used. This was done to help cover the stratified nature of the workers and in turn help to capture all the possible perceptions across the groups. Various income groups have different perceptions about food and this can only be captured by a random stratified sample.

Trainings on kitchen garden were given to the housewives and also kitchen garden kit was supplied to 60 households. Various types of vegetable seeds such as Spinach, fenugreek, Shepu, Okra, Brijal, Curry leaves, Sponge Guard, Ridge Guard, Cluster Bean, Chilli, Tomato and beet was provided to the trainees as kitchen garden kit for nutritional kitchen garden (Marsh, 1996)

RESULTS AND DISCUSSIONS

The general information regarding the socio - economic status of selected household is given in Table 1.

Table : 1 Socioeconomic background of selected subject (n=60)

Sr no.	Particulars	Number	Percentage
1	Age Group		
	20-30	00	00
	31-40	24	40
	41-50	22	36
	51-60	8	13
2	Literacy level (Male)		
	Primary education	24	40
	Secondary	20	33
	Higher secondary	12	20
	Graduated	4	6.66
3	Yearly Income		
	Rs. 20000-40000	18	30
	Rs 41000-60000	24	40
	Rs 61000-80000	6	10
	Rs 81000-100000	12	20
4	Food Habits		
	Vegetarian	42	70
	Non Vegetarian	18	30

The maximum percentage (40%) of selected housewives was found in the age group of 31 to 40 years and minimum percentage (0%) was found in the age group of 20 to 30 years (fig. 1).

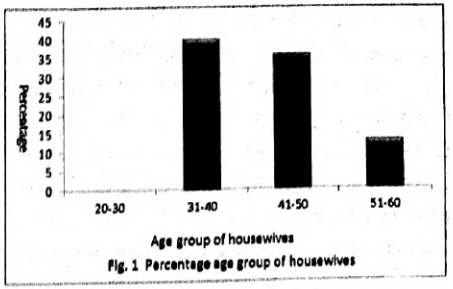

Fig. 1 Percentage age group of housewives

From Figure 2 It shows that the educational status of literate housewives varied from primary education (40%), Secondary education (33%), higher secondary education (20%) and Graduate are only (6.66%).

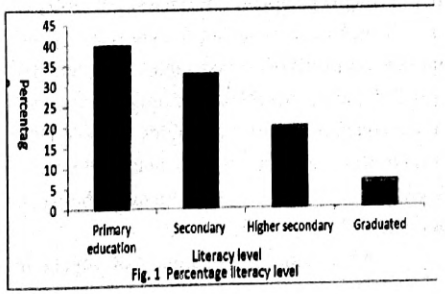

Fig. 1 Percentage literacy level

The majority of the household (40%) were having yearly income between Rs. 41000-60000, 10 percent had income between Rs. 61000-80000 /year and 30% families were having yearly income less than 20000-40000and only 6% families earned more than 80000 rupees per year. Majority of the household (70%) were non-vegetarian and (30%) families found to be Vegetarian (Table 1).

Above result indicate that majority of the surveyed housewives were middle aged. The literacy level of house wives as well as heads of families was good. Most of them were primary educated and middle income group.

Table : 2 Expenditure on GLV and other vegetables by selected areas (n=60)

Sr.no.	Particulars	Before giving training and kitchen garden kit		After giving training and kitchen garden kit	
1	Spend money monthly on vegetable purchasing	Number	Percentage	Number	Percentage
	100-200	10	16.66	30	50
	201-300	30	50	16	26.66
	301-400	14	23.33	12	20
	401-500	6	10	1	3.33

Before intervention majority of the household (50%) were spend money on purchasing vegetables between Rs. 201-300 per month and only 10% household were spend money on purchasing vegetables between Rs. 401-500 per month. 23% household were spend money on purchasing vegetables between Rs. 301-400/month and 16.66% household were spend money on purchasing vegetables between Rs. 100-200 per month (Table 2).

After training and supply of vegetable kit of kitchen garden, 50% household were spend their money for purchasing vegetables between Rs. 100-200 per month and only 3.33% families were spend money on purchasing vegetables between Rs. 401-500 per month.

From results it is clear that the beneficiaries who got the training and support on kitchen garden, they grows fresh vegetables in their household only and save near about 200 to 300 Rs per month. Only 3.33 percent people invest their money on purchasing of vegetables.

Table : 3 Daily consumption of vegetables and tubers by selected area

Sr.no.	Particulars	Before giving training and kitchen garden kit		After giving training and kitchen garden kit	
1	Daily Consumption of vegetable	Number	Percentage	Number	Percentage
	125-250gm/day	14	23	5	8.33
	250-375gm/day	25	41.66	10	16.66
	375-500gm/day	12	20	15	25
	Above 500gm/day	9	15	30	50

Before training on kitchen garden 23% families consumed vegetables and tubers between 125-250 g/day and only 15% families were consumed vegetables and tubers above 500 g per day. After training and getting knowledge about healthy food 50% families were consumed vegetables and tubers above 500 g/day and only 8% families were consumed vegetables and tubers between 125-250 g per day.

This result indicates that after getting training and kitchen kit the consumption vegetables and tubers increased by 27%.

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SHG BANK LINKAGE PROGRAMME AS A VACCINE FOR WOMEN EMPOWERMENT IN INDIA.

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ABSTRACT

In the changed context of rural development, there is more emphasis on sustainable development and empowerment of women in India which demand micro credit. Empower the women in social, political, economical and legal aspects became necessary to convert the idle society into self-sustainable society. Women empowerment can be achieved through political power, education, employment and SHG. Among these, SHG dominate and fruitful success of the women empowerment. SHG mainly concerned with the enlistment of the women in the society through, social, economical aspects. SHG not only mobilize micro finance and provide micro credit to the needed members but also it provides self employment training, awareness programme, promote the leadership qualities and confidential life to its members. This paper is concerned with empowerment of women and delineates the status of women, and the impact of SHG bank linkage programme on women empowerment.

Keywords : Empowerment, self helf group, micro credit.

Total theme is based on the fact that economy of a nation can be improved only when the quality of life of the citizens of a nation can be effectively improved only by raising the standards of living of the people on the street and in backward areas. Social empowerment in general and women empowerment in particular is very fundamental in achieving this goal. It leads to provide and bring the empowerment to the women In India, at the end of ninth five year pan 26.1% of the population was living below poverty line. In the rural area 27.1% of the population was living under poverty. The overall unemployment rate is estimated to 7.32%. The female unemployment rate is 8.5%. The rate of growth of women unemployment in the rural area is 9.8%.The Govt. of India introduced many various schemes to reduce poverty and to promote the gainful employment. But the more attractive scheme with less effort (finance) is "Self Help Group". It is a too to remove poverty and improve the rural development

The importance of women to economic development of India was first recognized during the country's struggle for independence. Women-owned business has the potential to make significant contributions to Job creation and economic growth, economic empowerment of women changes the balance of power because its allow half the world's population to contemplate higher goals than basic survival. In rural areas, there is a urgent need of empowering women. The formation off SHGs and microfinance will enhance their socio-economic status in society. Mohd. Yunus, born 1940, is a Bangladeshi banker and the developer

and founder of Concept of micro credit. With the help of micro finance, women get small loan for business and its gives them an independent means of generating wealth and becoming self-reliant in a society.

MATERIALS AND METHODS

The study is a humble effort to assess the SELF HELP GROUP BANK LINKAGE PROGRAMME and impact of SHG based micro-finance on socio-economic empowerment of rural women for their development as well as effective functioning of SHGs.

This is a descriptive research paper, this study is compiled with the help of the secondary data. Secondary data have been finding out by googling in different websites, Books, Journals and Magazines.

Concept of Empowerment

What do we mean by empowerment? When does the well-being of a person improve? Nobel Laureate Amartaya Sen (1993) explains that the freedom to lead different types of life is reflected in the person's capability set. The capability of a person depends on a variety of factors, including personal characteristics and social arrangements. However, the full accounting of individual freedom goes beyond the capabilities of personal living. For example, if we do not have the courage to choose to live in a particular way, even though we could live that way if we so chose, can it be said that we do have the freedom to live that way, i.e. the corresponding capability? Another important point made by Sen (1990) is that for measurement purposes one should focus on certain universally-valued functioning, which relate to the basic fundamentals of survival and well-being, regardless of context. Taking the example of universally valued functioning like proper nourishment, good health and shelter, Sen asserts that if there are systematic gender differences in these very basic functioning achievements, they can be taken as an evidence of inequalities in underlying capabilities rather than differences in preferences. Anna's (1993) explains that two actual norms for human life exist globally: in no society is it indifferent to the shape of ones life and what one can make of it, whether one is a man or a woman. One's sex may close some options completely, or make them less available but it always makes a difference to what ones options is over ones life as a whole. According to her, in a traditional society norms for the lives of men and women are enforced strongly and there exists actual division of activities and ways of living. When we look at a society more traditional than our own, we systematically perceive injustice in the ways in which the two norms impose different kinds of life on men and women, however as soon as we position ourselves with regard to a more traditional society it is obvious that injustice results from the existence of two norms. In the feminist paradigm, empowerment goes beyond economic betterment and well-being, to strategic gender interests. As Mayoux (1998) suggests, Empowerment is a process of internal change, or power within, augmentation of capabilities, or power to, and collective mobilization of women, and when possible men, or power with, to the purpose of questioning and changing the subordination connected with gender, or power over. Empowerment can range from personal empowerment that can exist within the existing social order. Thus this kind of empowerment would correspond to the right to make one's own choices, to increased autonomy and to control over economic resources. But self confidence

and self-esteem also play an essential role in change. Empowerment signifies increased participation in decision-making and it is this process through which people feel themselves to be capable of making decisions and the right to do so (Kabeer, 2001). Personal empowerment can lead to changes in existing institutions and norms, however, without the collective empowerment the personal empowerment and choices are limited, as Sen explains. The nature of empowerment can be diverse, depending upon the parameters that define the lack of power within the institutional framework in operation. North (1990) points out that institutions are humanly devised constraints that shape human behavior and they structure incentives in human exchange, whether political, social or economic. It is the social or cultural environment that results in the varying degree of empowerment of different members of the society and which are broadly determined by not only formal constraints, such as rules of law, but also informal constraints, such as the codes of conduct. Malhotra ET. Al (2002) constructed a list of the most commonly used dimensions of women's empowerment, drawing from the frameworks developed by various authors in different fields of social sciences. Allowing for overlap, these frameworks suggest that women's empowerment needs to occur along multiple dimensions including: economic, socio-cultural, familial/interpersonal, legal, political, and psychological. Since these dimensions cover a broad range of factors, women may be empowered within one of these sub-domains. They give the example of"socio-cultural" dimension which covers a range of empowerment sub-domains, from marriage systems to norms regarding women's physical mobility, to no familial social support systems and networks available to women. The World Bank defines empowerment as "the process of increasing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets, and improve the efficiency and fairness of the organizational and institutional context which govern the use of these assets."83 Thus, as the World Bank (2001) report confirms, societies that discriminate on the basis of gender pays the cost of greater poverty, slower economic growth, weaker governance and a lower living standard of their people. The World Bank also identifies four key elements of empowerment to draft institutional reforms: access to information; inclusion and participation; accountability; and local organizational capacity.

Women Empowerment

Women empowerment became a developing concept, which leads to bring a better society in the world. It providing powers and act them to become independent society builders with potential challenges to the future generation. We cannot omit the women contribution to the socio-economic development of the nation. Empower the women in social, political, economical and legal aspects became necessary to convert the idle society into self-sustainable society. Women empowerment can be achieved through political power, education, employment and SHG. Among these, SHG dominate and fruitful success of the women empowerment. women's empowerment needs to occur along multiple dimensions including: economic, socio-cultural, familial/interpersonal, legal, political, and psychological. Since these dimensions

cover a broad range of factors, women may be empowered within one of these sub-domains. They give the example of "socio-cultural" dimension which covers a range of empowerment sub-domains, from marriage systems to norms regarding women's physical mobility, to no familial social support systems and networks available to women. The World Bank defines empowerment as "the process of increasing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. The quality of life of the citizens of a nation can be effectively improved only by raising the standards of living of the people on the street and in backward areas. Social empowerment in general and women empowerment in particular is very fundamental in achieving this goal.

Women Development

Empowerment Paradigms

Cardin Moser (1989) has identified five paradigms towards women's development in Third World countries (Chart 1). The first paradigm related to welfare approach is based on the traditional view of marking the women's role in development or the basis of customary gender division of labor. The second paradigm came in existence during 1975-85, when the decade was declared as the 'Decade of Women'. This approach was aimed at gaining equity and procuring her as active participant in development process. It further aimed at giving equal opportunities to women even by creating positive discrimination or reservation. The third paradigm was concerned with anti poverty, directed at poor women to ensure and increase their productivity. This is still being followed under the assumption that women's problems arise out of under-development. In this context, the approach of rural development is increasingly confronting itself to the formation of Self Help Groups (SHG's), in stabilizing and linking with viable socioeconomic activities for sustainable livelihood. This is seen as the only solution of poverty eradication, equity and development of women. The fourth paradigm is related with efficiency which depends on the belief that policies of economic stabilization and adjustment rely on women's economic contribution to development and their economic participation is seen as a mechanism to achieve equity. The fifth paradigm is empowerment model, which envisages greater.

Paradigms shifts in Development

The experience of the more than five decades has demonstrated that there is always a possibility to develop but it is not invincible to occur. It is indent a few countries succeeding in rapid economic growth and poverty alleviation, while others not being so successful. Even measured by minimum standard of a dollar a day people living in poverty are about 1.3 billion out which 8 percent poor live in Uttar Pradesh, and the country topping the list in this respect. Many development strategies experimented so far have not yielded the desired results. For more than four decades, development was seen mainly as a measure of economics – increasing the capital stock and improving the allocation of resources. However, the Economists differed in their view of how best to improve resources and to their allocation, and the role government in this exercise. In 1980's, the development strategy shifted from micro management policies to macro economic policies along with adjustment of fiscal imbalances and monetary policies. The collapse of the socialist economies in the world and end the cold war demonstrated the inefficacy of a larger government role in the

national economies. The new phase of development thereafter was followed by the policies of (L.P.G.) liberalization, privatization and globalization. However, this concept did not find four in many developing countries and is still at a very nascent stage. The rapid growth of most of the East Asian economies showed that successful development could be accompanied by reduction of poverty, widespread improvements in living standards and even in process of democratization. But for those advocating the technical solutions, the East-Asian countries were deeply disturbing. In most cases, national government played a larger role. They followed some of the accepted technical prescriptions, such as stable macro economic policies. Governments intervened in trade, though more to promote exports than to inhibit particular imports. They regulated financial markets, engaged in mild financial restraint by lowering interest rates and increasing profitability of banks and other financial institutions. There is wide spread recognition that even countries pursuing good economic policies can suffer from the volatility of short term capital flows while the risks and market failures associated with short

term capital flows have now become apparent, the benefits especially for countries like those in East Asia with high savings rates remain unproven. The new development strategy takes up the transformation of the society as its core objective to development. It recognizes that an integral part of successful development is the increase in GDP per capital. It first needs to set forth the vision of the transformation, which may embrace certain quantitative goods, such as a reduction in poverty by half or universal primary education, or an increase in life expectancy by ten years, or a fall in crime by 30 percent but these are elements in or targets for the transformation process, not the vision of the transformation itself. This vision needs to include a view of transformation of the institutions, the creation of new social capital and new regulatory or incentive-mechanisms. The mandatory and Key ingredients in a successful development strategy are ownership and participation. By involving public support groups of the civil society, the process of strategy formulation may be able to elicit the commitment and democratic involvement that is necessary to be socially acceptable and sustainable. Ownership and participation are also mandatory if the development strategy is to be adapted to the specific circumstances of a country. Recent researches prove that the projects with higher degree of active participation have been more successful and profitable. Although, the development priorities differ from country to country, yet there are some common elements. The most important is education, because without education a country cannot develop i.e. cannot attract and build modern industries and cannot adopt new modified technologies rapidly in the rural sector. Education also enables people to learn, to acquire values and standards of behavior, and also to accept and help engender transformation. Importantly, infrastructure particularly protection or property, communication, and transportation is vital for the conduct of business in modern times.

Necessarily in developing countries sense of isolation reduced. Health is again very important because unhealthy population cannot be a productive labor force. The basic quality of health should be viewed as a fundamental human right and upgrading health standard

must be an integral part of any holistic development strategy. Knowledge, like education, enriches the human spirit and with education and health, it leads to a more productive society. The power of Knowledge is enormous as with increased knowledge, the output that can be produced with the limited resources can be multiplied in magnitude. The Capacity building of the individuals is must to empower them for social transformation, economic development, participation in development process and representation in governance. Hence a country aspiring to develop must have institutions, entrepreneurship and leadership to catalyze, absorb and manage the process of change and the changed society.

Origin and Concept of SHGs

The origin of SHGs is from the brainchild of Grameen Bank of Bangladesh, which was founded by Mohammed Yunus. SHGs were started and formed in 1975. In India NABARD is initiated in 1986-87. But the real effort was taken after 1991-92 from the linkage of SHGs with the banks. A SHG is a small economically homogeneous affinity group of the rural poor voluntarily coming together to save small amount regularly, which are deposited in a common fund to meet members emergency needs and to provide collateral free loans decided by the group. (Abhaskumar Jha 2000). They have been recognized as useful tool to help the poor and as an alternative mechanism to meet the urgent credit needs of poor through thrift (V. M. Rao 2002) SHG is a media for the development of saving habit among the women (S. Raja Mohan 2003). SHGs enhance the equality of status of women as participants, decision-makers and beneficiaries in the democratic, economic, social and cultural spheres of life. (Ritu Jain 2003). The basic principles of the SHGs are group approach, mutual trust, organization of small and manageable groups, group cohesiveness, spirit of thrift, demand based lending, collateral free, women friendly loan, peer group pressure in repayment, skill training capacity building and empowerment (N.Lalitha). In Tamil Nadu the SHGs were started in 1989 at Dharma Uri District. At present 1.40 lakh groups are function with 23.83 lakh members. At present, many men also eager to form SHGs.

The SHG offerings

The SHG offers the canvas to conduct social intermediation, provide women the opportunity to acquire the ability and entitlement to their own lives, set their own agenda, gain skills, solve problems and develop autonomy (Meenai, 2003). Significantly, the member of SHG's may exhibit the following outputs, resulting from their activities:

a) Acquisition of literacy and numerically skills;
b) Awareness of basic legal rights;
c) Awareness of projects and state development activities;
d) Critical political consciousness; electoral process, societal analysis and gender issues;
e) Enhanced social status as perceived by self and other's;
f) Freedom from exploitation, money lenders, landlords etc;
g) Active role in organization of group and other political bodies, viz. Panchayat;
h) Ensuring literacy and education of girl child;
i) Health consciousness;
j) Restructuring of women's time utilization; and

k) Enhanced decision making powers within the household.

Today, there is over 100000 women's Self Help Group reporting to have credit linkage with bank through micro credit schemes. These groups have been promoted with the support of NGOs (something under national schemes) and bilateral or multilateral donors, like United Nations and the World Bank. Actually, the World Bank has set a target of reaching 100 million of the world's poorest people with micro credit schemes, and has placed micro credit at the center of its global strategy for poverty alleviation. In India, NABARD plays a key role in assisting banks and NGOs involved in micro finance schemes.

SHGs and Women Empowerment

The complexity of the concept of 'women empowerment' is clear from the different interpretations and methodologies that have been used to measure it. It is therefore not surprising that every investigation of the impact of microfinance programmes on women empowerment has its own incomplete interpretation of the concept. Using the World Bank's definition of empowerment along with Kabeer's sensible interpretation of women empowerment within the South Asian context, this paper argues for a more strict interpretation of women empowerment. It is interpreted as the process in which a woman challenges the existing norms and culture to effectively improve her well-being. A distinction is therefore made between the outcomes that lead to greater efficiency within the existing norms, community driven development (CDD) and outcomes that can be directly interpreted as women empowerment. For instance, activities like improvement in nutrition of children, lead to greater efficiency in the woman's role in the household but it also falls within the existing role of the women within the norms of the society. When a woman is better able to perform such activities, it leads to an increase in her self-confidence and feeling of well being. This might create conditions leading to woman empowerment, but are not empowering on their own. Similarly, Community Driven Development activities, undertaken under the initiative of the SHGs – for instance, solving drinking water problems in the village, reduces the demand on a woman's time while leading to better health of all household members, particularly children. However, most of these activities are for the welfare at the household (including women) or community but are not directly empowering. According to our definition, the truly empowering activities are those that reflect the changes that women have effectively made to better their lives by resisting the existing norms of the society. Over the past decades, subsidized rural banking in India, despite its large network of rural bank branches has failed to reach the poorer sections of the society. By the early 1980s, the All India Debt and Investment Survey (Government of India, 1981) showed that the share of non-institutional agencies (informal lenders) in outstanding cash dues of the rural households was 38%. The main limiting factor in reaching formal finance to this group was the high transaction costs and lack of appropriate credit and saving products. A study conducted by NABARD in the mid-eighties revealed that financial services required by poor households are: safe-keeping of small surpluses in the form of thrift; access to consumption loans to meet emergency needs and financial services and products that did not require collateral (MYRADA, 2002). The Self Help Group Bank Linkage model evolved from the

pioneering efforts of NABARD and two NGOs, MYRADA and PRADAN in starting with SHG groups in the early 1990s, the cumulative numbers of SHGs that have been financed have increased to 1,612,456 by March 2005. The expansion of the SHG-bank linkage programme has been accelerated in the past few years. It has reached an estimated 17.5 million people and disbursed more than Rs. 68 billion in cumulative bank loans up to March 2005, using a network of 41,062 bank branches and 6,228 NGOs.

The Self-help Group Bank Linkage Programme

NABARD (2005) explains that the Self Help Group is a group with "an average size of about 15 people from a homogeneous class. They come together for addressing their common problems. They are encouraged to make voluntary thrift on a regular basis. They use this pooled resource to make small interest bearing loans to their members. The process helps them imbibe the essentials of financial intermediation including prioritisation of needs, setting terms and conditions and accounts keeping. This gradually builds financial discipline in all of them. They also learn to handle resources of a size that is much beyond the individual capacities of any of them. The SHG members begin to appreciate that resources are limited and have a cost. Once the groups show this mature financial behavior, banks are encouraged to make loans to the SHG in certain multiples of the accumulated savings of the SHG. The bank loans are given without any collateral and at market interest rates. The groups continue to decide the terms of loans to their own members. Since the groups' own accumulated savings are part and parcel of the aggregate loans made by the groups to their members, past prudence ensures timely repayments. The SHG bank linkage programme has a SHG getting its bank loan, where the bank provides a loan to a mature group. The group gives its savings in the group deposit account in the bank (at around 12% per annum), using its group corpus and group goodness as a collateral (NABARD), provides subsidized refinancing support to banks to encourage such lending. However, the demand for such refinancing support to banks has fallen as SHG lending is more profitable and has lower default rates (less than 1% as compared to 11-12% of their regular portfolios) (Basu and Srivastava, 2005). The NABARD SHG bank linkage programme has achieved only 1.6% of the potential demand, reaching out to seven million households with an average credit of Rs. 2,000/- household, as against the need to reach 100 million with Rs. 10,000 per household. The microfinance institutions (MFIs) on the other hand, have been able to meet only 0.25% of the demand (Mahajan, 2002). India has 37% of the world's population earning less than $1 a day, of which 60% are women (Human Development Report, 2005). The Government of India, National Policy for the Empowerment of Women (2001), declared various measures aimed towards achieving greater equality between men and women. In 1993, the Indian government ratified the International Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW). The government's poverty alleviation programmes such as Swarnajayanti Gram Swarojgar Yojna (SGSY) and the Rashtriya Mahila Kosh implement their programmes through microfinance interventions of NABARD's Self Help Group bank linkage

programme. Apart from the large numbers of households that the programme services, the following features make the SHG-bank linkage unique.

1. The distinctive process of formation of the SHG and the features that they learn in tackling the issue of their working and responsibility within the group, once they acquire the loan.
2. The use of the existing and extensive infrastructure of rural bank branches for delivering microfinance services.
3. These distinctive ways of linking the SHG to the banks through NGO's, commercial and rural banks, with the NGO's playing a major role in promotion of the SHG's and their training.
4. The government's poverty alleviation programmes such as Swarnajayanti Gram Swarojgar Yojna (SGSY) and the Rashtriya Mahila Kosh implement their programmes through microfinance interventions.

Using higher rates of savings, borrowings, timely repayment of credit, promptness in attending SHG meetings and decisions by individual members as indicators of enhanced credit access, income generation and socio-economic empowerment. Over the past decades, subsidized rural banking in India, despite its large network of rural bank branches has failed to reach the poorer sections of the society. By the early 1980s, the All India Debt and Investment Survey (Government of India, 1981) showed that the share of non-institutional agencies (informal lenders) in outstanding cash dues of the rural households was 38%. The main limiting factor in reaching formal finance to this group was the high transaction costs and lack of appropriate credit and saving products. A study conducted by NABARD in the mid-eighties revealed that financial services required by poor households are safe-keeping of small surpluses at the time of birth access to consumption loans in case of emergency, credit and financial services and products that do not require collateral (NABARD, 2002). The Self Help Group bank linkage model evolved from the pioneering efforts of MYRADA and two NGO's, MYRADA and PRADAN in starting with SHG groups in the early 1990s, the cumulative numbers of SHG's that have been financed have increased to 1,612,456, by March 2005. The expansion of the SHG-bank linkage programme has been accelerated in the past few years. It reached an estimated 17.5 million people and disbursed more than Rs. 68 billion in cumulative bank loans up to March 2005, using a network of 41,062 bank branches and 6,228 NGO's.

Impact of the SHG-Bank Linkage Programme

Microfinance has reduced the incidence of poverty through increase in income, enabled the poor to build assets and thereby reduce their vulnerability.

It has enabled household that have access to it to spend more on education than non-client households. Families participating in the programme have reported better school attendance and lower drop out rates.

It has empowered women by enhancing their contribution to household income, increasing the value of their assets and generally by giving them better control over decisions that affect lives.

In certain areas it has reduced child mortality, improved maternal health and the ability of the poor to combat disease through better nutrition, housing and health – especially among women and children.

It has contributed to a reduced dependency on informal money lenders and other non-institutional sources.

It has facilitated significant research into the provision of financial services for the poor and helped in building 'capacity' at the SHG level.

Finally it has offered space for different stakeholders to innovate, learn and replicate. As a result, some NGOs have added micro-insurance products to their portfolios, a couple of federations have experimented with undertaking livelihood activities and grain banks have been

successfully built into the SHG model in the eastern region. SHGs in some areas have employed local accountants for keeping their books and IT applications are now being explored by almost all for better MIS, accounting and internal controls.

CONCLUSION

The study suggests that a lot needs to change to make women truly empowered. it is difficult to believe that a minimalist SHGs programme would have sustainable impact on the empowerment of women. SHGs, where a majority of groups are linked with the help of NGOs that provide support in financial services and specialized training, have a greater ability to make a positive impact on women empowerment. If women empowerment is to be pursued as a serious objective by SHG programmes in particular and the larger microfinance community in general, greater emphasis needs to be placed on training, education and creating awareness in order to achieve a larger and more lasting empowerment. Rural women play a significant role in the domestic and Socio-economic life of the society and therefore, holistic national development is not possible without developing this segment of the society. The review of studies related to credit accessibility to women simply demonstrates that the direct access to institutional credit to rural women is very limited and suffers from the sex bias in extending it to them. However, women from the non-farm sector have better access to banks than the women working in the farm sector. Even, male members of women borrowers have greater influence on accessibility to credit utilization and its repayment. The SHG's became a regular component of the Indian financial system since 1996. The SHG's are small, informal and homogenous groups. These groups have proved as cyclic agents of development in both the rural and urban areas. The SHG's after being formed started collecting a fixed amount of thrift from each member regularly. After accumulating a reasonable amount of resources, the group starts lending to its members for pretty consumption needs. If the bank is satisfied with the group in terms of (i) genuineness of demand for credit; (ii) credit handling capacity of the members; (iii) repayment behavior within the groups; and (iv) the accounting system and maintenance of the records, it extends a term loan of smaller amount to the group.

Micro-finance interventions through SHGs programmes are well-recognized world over as an effective tool for poverty alleviation and improving socioeconomic status of rural poor in India too, micro-finance is making headway in its effort for reducing poverty and empowering rural women. Micro-finance through the network of cooperatives, commercial banks, regional rural banks, NABARD and NGO's has been largely a supply driven recent approach.

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GENETIC VARIATION IN CHRYSOMYA MEGACEPHALA F.

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ABSTRACT

Allozyme Esterase pattern was assessed in Crysomya megacephala a calliphorid fly. The twoone gene enzyme system was analyzed by using electophoretic techniques. Five zones of esterase activity werewhereas one zone of acid phosphatase were observed in zymogram of a single fly homogenate. In the order of increasing anodal migration, these zones were designated as, EST-1, EST-2, EST-3, EST-4, EST-5. Enzyme activity at EST-1, EST-2, EST-3, EST-4 loci were monomorphic while EST-5 and ACPH shows polymorphism for two electromorphs and three phenotypes.

Keywords: Crysomya, electromorphs, phenotypes, heterozygosity

The foundation of biochemical population genetics was laid by Lewontin and Hubby (1966) who introduced the technique of gel electrophoresis for the study of genetic polymorphism. The technique relies on the migration of proteins/ enzymes under an electrical field in starch/polyacrylamide gel matrix. The homogenates of samples are centrifuged, run on the gel matrix for migration and stained to visualize the proteins/ enzymes.Analysis of enzyme variations a valuable and cost effective marker for population genetic studies, despite the advent of several molecular markers in recent years. The blow flies of the family Calliphoridae are distributed world wide and some of the species belonging to this family are known to be causative agents of animal tissue myasis, causing several losses to sheep and cattle. The technique of isozyme electrophoresis to blow flies genetics was introduced by Bush et al (1976) in *Cochliomyia hominivorax*.In subsequent years, analysis of genetic variation among calliphorids have been carried out only in the genus *Cochliomyia* and *Calliphora*. Therefore, it is imperative that allozyme variations among other calliphorids be also analyzed to understand their genetic structure. In the present study one gene enzyme systems have been analyzed using gel electrophoretic techniques in *Chrysomya megacephala* with a view to unravel enzymetic polymorphism.

MATERIALS AND METHODS

The present work was carried out in *Chrysomya megacephala* F. (Calliphoridae: Diptera). Specimens were collected using sweep net from different localities of Allahabad and maintained at 27° + 1°C in insect rearing cages. Studies on enzyme staining patterns were carried out in adult male flies using polyacrylamide Gel Electrophoresis (PAGE) in tube gel electrophoresis apparatus on 7% polyacrylamide gel and selective enzyme staining protocols. The details of methods are described below.

Preparation of sample

Flies were taken out of cage and

anaesthetized with ether, wings and legs of individual male flies were removed before homogenization in [illegible] ml of chilled double distilled water in a glass and Teflon tissue grinder. The homogenates were centrifuged at [illegible] rpm and the supernatant was collected for further processing.

Casting of Gel

For gel casting the lower end of the gel tube (10 cm) was moistened with distilled water and fitted into the rubber grommets of the gel tube stand. The separating rod gel was prepared by mixing the following solutions: 7.5 ml 40% Acrylamide, 2.5 ml 2% N, N-Methylene Bisacrylamide (BIS), 5 ml gel buffer, 10 µl N, N, N', N' – Tetramethyl Ethylenediamine (TEMED), 7.5 ml double distilled water, 1.5 ml 0.28% Ammonium Persulphate.

The gel tubes were filled carefully up to about 2.5 cm below the top rim with the thoroughly mixed solution and immediately covered with a layer of distilled water to prevent meniscus formation. Water was removed after polymerization and the tubes were carefully inserted into the rubber grommets of the top buffer chamber. Electrode buffer was poured into the lower electrode chamber.

Electrophoresis

For electrophoresis 20 µl of the sample was loaded on top of the separating gel and covered with 20% sucrose solution mixed with 0.1% Bromophenol blue (in a ratio of 9:1). The gel tubes were then filled with electrode buffer up to the brim. Subsequently the upper electrode chamber was also filled with electrode buffer. The power supply unit (Pharmacia, EPS 400/500) was set up and electrophoresis was performed at 4°C at a constant current of 2.5 mA/gel tube. The run was terminated when the dye front reached the lower end of the gel.

Enzyme Staining

After electrophoresis individual gels were removed and stained in test tubes with specific enzyme staining solution in accordance with the procedures adopted from [illegible] et al. (1972), Tsakamoto (1989) and [illegible] (1990). The stained gels were stored in refrigerator in sealed tubes containing 7% acetic acid. For photography the gels were arranged in a row [illegible] on an illuminator with a [illegible] screen and photographed with Nikon [illegible] camera. Conventional method has been used for genetic interpretation of the observations. Single band indicates homozygotes and multiple bands/diffuse bands represent heterozygotes (Harry et al., [illegible]). Multiple loci were numbered in order of ascending migration distance from the origin and indicated by hyphenated numeral following the enzyme abbreviation, e.g. EST-1, EST-2. The relative mobility of each band was calculated and expressed as R value (R/100), following the method of Tsakamoto and [illegible] (1985).

$$R = \frac{\text{Migration distance of a band}}{\text{Migration distance of the buffer front}} \times 100$$

Electrophoretic genotypes were determined by comparing relative mobilities (Rf value x 100) of the bands. At the polymorphic loci, group of similar Rf values were considered to represent a single electromorph (terminology of King and Ohta, 1975) and the mean value for each group has been used to designate that electromorph. Frequencies of electromorphs were calculated from the genotype information for each enzyme. The heterozygosity (HE) was calculated as HE = 1 - Σ xi2 where xi is frequency of the ith electromorph at a locus. The mean heterozygosity (H) was calculated as the mean of HE over all loci examined. The calculated heterozygosity was compared with the observed heterozygosity. The deviations from Hardy-Weinberg equilibrium by Chi-square test.

RESULTS AND DISCUSSION

One gene-enzyme systems were analyzed to reveal genetic variation in Chrysomya megacephala in the present work. Multiple zones of activity were found in the esterase (EST).

Esterase (est. EC [illegible]) and ACID PHOSPHATASE (ACPH, EC [illegible])

Staining for esterase isozyme revealed five zones of activity. These loci have been designated as EST-1, EST-2, EST-3, EST-4 and EST-5 in order of increasing anodal mobility. However, the enzyme activity in four of these loci i.e. EST-1, EST-2, EST-3 and EST-4 were not clearly discernible in all the individuals; therefore, these have not been taken into consideration in the present study.

The enzyme activity at EST-5 locus is characterized by conspicuous and consistent bands in all the individuals. At EST-5 locus, three different electrophoretic phenotypes were found, which are assumed to be governed by two electromorphs, viz. slow migrating EST-5a and fast migrating EST-5b (Figure 1). The heterozygotes were characterized by broad diffuse bands. The relative mobility of EST-5a

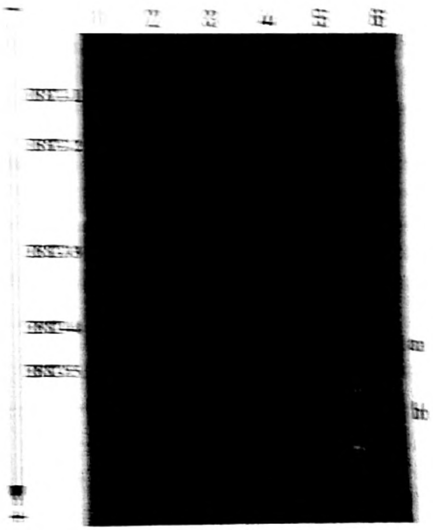

Figure 1: The staining pattern of EST

electromorphs is 61 and that of EST-5b electromorph is 56. The electromorphs EST-5a and EST-5b are present with a frequency of 0.60 and 0.40, respectively, in the sample analyzed during the present study. The observed and expected heterozygosity values were 0.14 and 0.50, respectively. Chi-square test revealed that the distribution of electrophoretic phenotypes were not in Hardy-Weinberg equilibrium.

Electrophoretic phenotype distribution, electromorph frequencies, heterozygosities relative mobilities and Chi-square values at

Table – 1 : Electrophoretic phenotype distribution, electromorph frequencies, heterozygosities relative mobilities and Chi-square values at EST-5 locus in Chrysomya megacephala.

	[redacted]		Electromorph Frequency		Heterozygosity	
[redacted]						
Obs.	[redacted]	14	0.60	[redacted]	0.14	0.50
[redacted]						
χ = 48.03 (P > 0.01)						

EST-5 locus in Chrysomya megacephala. The electrophoretic phenotype distribution, electromorph frequencies, heterozygosities, relative mobilities and Chi-square values at EST-5 locus are presented in =Percent relative mobility Rf(x100), n= Sample size, Ho=Observed heterozygosity =No. of heterozygotes, Total No. of individuals,

Table - 2 : Electrophoretic phenotype distribution, electromorph frequencies, heterozygosities, relative mobilities and Chi-square values at ACPH locus in *Chrysomya megacephala*

	Electrophoretic Phenotype Frequency			Electromorph Frequency		Heterozygosity	
n=100	aa	ab	bb	A	b	(H_o)	(H_E)
Obs	36	31	33	0.52	0.48	0.31	0.49
Exp.	27.04	50.96	24.01	53*	61*		

χ^2 = 5.46 (p between 0.20 and 0.05)
* = Percent relative mobility (R_f x 100)
n = Sample size

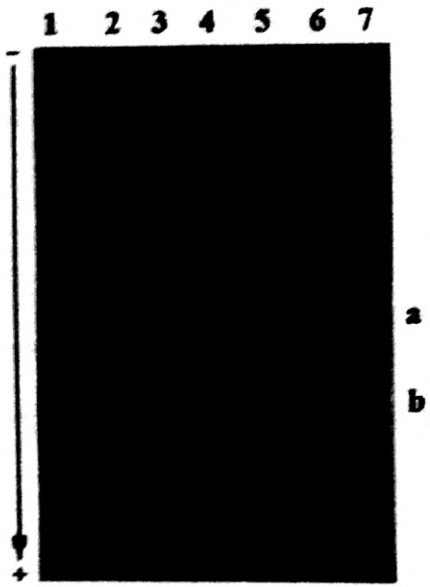

Fig. 1

HE=Expected heterozygosity =1 - Xi2 (where Xi is the frequency of ith electromorph).

The observed heterozygosity in *Chrysomya megacephala* was found to be 0.140 in the present study which is higher than the average value found in invertebrates 0.134 (Ayala 1983) and in other dipterans 0.115 (Graur 1985). These flies are characterized by large heterozygosities as compared to other dipterans. It has been suggested that higher population density leads to greater genetic diversity as compared to small population size which shows low diversity (Krafsur et al.,1992, 2005, Krafsur and Griffiths 1997). Several factors such as environmental conditions, genetic drift, population bottle neck, colonization, host availability and reproductive pressures are known to influence genetic variations within and among populations. In general the species populations distributed over a large variety of environmental conditions are known to be genetically more heterozygous as compared to the species with restricted distribution (Narang, 1980, Scarpassa and Hamada, 2003, Santos et al., 2005). It is interesting to note that all the calliphorids reveal large allelic diversities and enzyme microsatellite heterozygosities, a characteristic feature expected for a species with large population size. However, it is imperative that genetic characterization of geographically diverse populations of different *Chrysomya species* from India should be carried out with the help of allozyme and other molecular markers to evaluate the extent of genetic differentiation between population and process of biogeographic patterns of genetic variations.

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STUDIES ON THE PHENOTYPIC CORRELATION COEFFICIENT IN GUAVA CROP (PSIDIUM GUAJAVA .L)

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ABSTRACT

The investigation was carried out at Department of Horticulture, KAPG College , Allahabad,(U.P.). The five year old plants of 14 varieties (V_1-V_{14}) were taken for the study .The design was used RBD with three replications. Twelve distinguishable characters were taken for study. Theoretically, Guava being self pollinated crop, it has narrow genetic base which limits selection and genetic improvement for the desired characters. Phenotypic correlation coefficient clearly depicts the extent of correlation among the characters studied, which further provide the path for improvement. It is clear from the Table 1 that the size of flower had a positive correlation with diameter of fruit, weight of fruit, days required to fruit maturity, number of seeds per plant and Total Soluble Solids during both the years of experiment. Fruit length had positive correlation with number of seeds per fruit ,TSS,Total Sugar and reducing & non reducing sugar,sizeof flower has positive and significant correlation with no. of seeds per fruit .Length of fruit revealed positive and significant correlation with total sugar content & reducing sugar .Diameter of fruit had positive correlation with weight of fruit and days required to fruit maturity .Similarly number of seeds per fruit and TSS exhibited positive correlation with all other characters.

Keywords : **Guava, correlation, phenotypic, character.**

Guava the miracle of waste land with inbuilt hardiness has emence potential to exploitation for the welfare of human beings. Being nutritionally rich it is rightly called the apple of tropics. It is a self pollinated crop with narrow genetic base .It is well aclamitised in tropical and sub-tropical parts of our country, especially Allahabad –Kanpur belt. This pocket has several strains needs to identify, compare, selection, improvement and proliferation to the commercialization. Correlation coefficient measures the degree of mutual relationship between two or more variables and it is also essential for improvement in quality as well as quantity of the crop .In case of two or more desirable characters showing positive correlation the selections for one character will automatically helps selecting another correlated character. On the other hand, in case of two or more characters are positively associated and one of them is desirable for breaking such association intensive crossing program has has to be launched. Once correlation among the characters analyzed the further improvement may get impetus for the welfare of our rural masses ingased in the cultivation. Keeping these aspects in view, the experiment was undertaken to ascertain the correlation coefficient among the characters in guava crop.

MATERIALS AND METHODS

The investigation was carried out the Department of Horticulture; KAPG College, Allahabad (U.P.) .The design applied was RBD with three replications. Five year old plants of fourteen verities i.e.V_1-V_{14} (Four -V_1-V_4,

Table 1: Phenotypic Correlation Coefficient for 12 characters (Pooled Data)

S.No.	Characters	Size of flower	Pollen grain size	Fruit length	Fruit Diameter	Weight Fruit	Days Required From Fruit maturity	No. of seeds/ fruit	Total soluble solids	Acidity content	Total sugar content	Reducing sugar content	Non Reducing
1.	Size of flower	1.000											
2.	Pollen grain size	0.198	1.000										
3.	Fruit length	-0.098	0.098	1.000									
4.	Fruit Diameter	0.142	0.108	-0.978	1.000								
5.	Weight Fruit	0.124	0.108	-0.168	0.862	1.000							
6.	Days required From Fruit maturity	0.202	-0.018	-0.220	0.824***	0.747***	1.000						
7.	No. of seeds/ fruit	0.445**	-0.728***	0.283	0.287	0.176	0.448	1.000					
8.	Fruit soluble solids	0.018	-0.882	0.834	-0.813	-0.380	-0.2880	-0.0007	1.000				
9.	Acidity content	-0.393	-0.823***	-0.889	-0.183	-0.416	-0.119	0.249	0.247	1.000			
10.	Total sugar content	-0.183	0.009	0.412	-0.423***	-0.828***	-0.802***	-0.406**	0.198	0.991	1.000		
11.	Reducing sugar content	-0.889***	0.017	0.199	-0.889***	-0.800***	-0.822***	-0.251	0.122	0.993	0.666	1.000	
12.	Non reducing	-0.232	-0.0177	0.203	-0.818	-0.880	-0.884	-0.460	0.493	0.9939	0.361	0.327	1.000

commercial cultivars of the area i.e. Allahabad Safeda, L-49, Apple colour and Red Flashed Guava, (Four V_1-V_4 selections and Six V_5-V_{10} cultures were selected. The site of crop was Kanpur Gangetic region (river bed areas). Twelve prominent distinguishable characters i.e. size of flower, pollen grain size, length of fruit, diameter of fruit, weight of fruit, days require to fruit maturity, number of seeds per fruit, TSS content, Acidity content, Total sugar content ,Reducing sugar and Non reducing sugar content were studied . The correlation coefficient was worked out with the method given Al-Jibouri *et al.* 1958

RESULTS AND DISCUSSION

All the twelve characters were critically investigated and correlation coefficient was analysed.The data clearly showed (Table 1) that the size of flower has significant positive correlation with diameter of fruit (0.142),weight of fruit (0.124), days require to fruit maturity (0.202) no. of seeds per fruit (0.445) and TSS (0.018), while it showed negative correlation with pollen grain size, acidity content, reducing, non-reducing and total sugar content . pollen grain size has positive correlation with fruit diameter (0.108), fruit weight (0.108) ,TSS (0.097) content and rest characters found to be showed negative correlation .

Length of fruit showed positive correlation with number of seeds fruit (0.253), TSS (0.534), reducing (0.199), non-reducing (0.205) and total sugar content (0.421). Diameter of fruit showed positive correlation with weight of fruit (0.862) and days required to fruit maturity (0.824). Weight of fruit had positive correlation with number of seeds per fruit (0.176).

Total sugar has positive correlation with pollen grain size (0.097), fruit length (0.412) and acidity content (0.991). TSS had positive correlation with size of flower (0.018), length of fruit (0.334) Acidity content had positive correlation with no of seeds per fruit (0.249). Reducing sugar content had positive correlation with length of fruit (0.199) TSS (0.122) acidity (0.303) non reducing sugar content also had positive correlation with fruit length(0.203) and TSS (0.493) These findings are in conformity with the findings of Johnson *et al* (1955), Kumar *et al* (2004), Mukherjee and Dutta (1967), Shanker *et al* (1967) & Shikhamani *et al* (1988)

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PRE-SOWING SEED TREATMENT OF SOYBEAN FOR INVIGORATION AND BETTER CROP ESTEBLISHMENT

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ABSTRACT

Pre-sowing seed treatment of soybean CV.NRC-37 was applied with five treatments viz. hydration for 16-18 hrs and drying at room temperature below 25°C, 2.0 per cent $CaCl_2$ at room temperature, hydration with 50 ppm GA_3 for 16-18 hrs and surface drying at room temperature, hydration for 16-18 hrs and drying at room temperature followed by dry seed dressing with thiram @ 0.25 per cent as well as hydration with 0.5 per cent KNO3 for 16-18 hrs and drying at room temperature over control. **The results revel that the seed treatment as hydration with 50 ppm GA3 for 16-18 hrs and surface drying at room temperature was significantly superior followed by hydration for 16-18 hrs and drying at room temperature below 25°C to improve plant stand and seed quality parameters. Significantly negative impact was also observed on plant stand and seed quality parameters if Soybean seed treated with 2.0 per cent $CaCl_2$ at room temperature, hydration for 16-18 hrs followed by dry seed dressing with thiram @ 0.25% as well as hydration with 0.5 per cent KNO3 for 16-18 hrs followed by seed drying at room temperature over control.**

Keywords : Seed, soybean, treatment

Soybean is one of the important oil seed crop in the world. It was introduced in India during mid-sixteen century and its commercial cultivation, now a days, it is restricted mainly in Madhya Pradesh, Maharastra, Rajasthan and Gujarat as well as small acerage in Himachal Pradesh, Punjab, Delhi and Uttar Pradesh particularly in Tarai area and Bundelkhand region. Soybean being a richest, cheapest and easiest source of best quality protein and fats which having a best multiplicity of uses as food and industrial products is known as wonder crop. The importance of quality seed has been felf since long. The storage and preservation of quality seed stocks till the next sowing season is also important for quality seed production. Seeds are subjected to deterioration as the physical appearance with aging. It is impossible to judge the storability of any seed. The potential storage life of seed varies from species to species (Harrington,1972 and Agrawal,1980) and within species among varieties and seed lots. Better invigoration and quality control in soybean were reported by Johnson and Wax,1978; Sathimeorthy and Vivekanandan,1988; Saha et al.,1998; Negalur et al.,2001 and Andric et al.,2004 as well as fungicidal seed treatment by Tekrony and Egli,1982, Agrawal and Sinclair,1992 and pre-sowing seed priming by Jagwinder et al.,2004, Parvez et al., 2005, Venkata et al., 2006 and Parmesh et al.,2006.

MATERIALS AND METHODS

Seed material of Soybean cultivar NRC 37 was collected from National Research Centre on Soybean, Indore, Madhya Pradesh.The seeds were dried to a moisture level of 12 per cent ,cleaned with the help of seed blower and graded with suitable seives to obtain uniform size. Pre-sowing seed treatment was applied as T1- Hydration for 16-18 hrs and drying at room temperature below 25°C, T2- hydration with 2.0 per cent Calcium Chloride

(CaCl2) at room temperature, T3-hydration with 50 ppm GA3 for 16-18 hrs and surface drying at room temperature, T4-Hydration for 16-18 hrs and drying at room temperature below 25°C followed by seed dressing with Thiram @ 0.25 per cent and T5-hydration with 0.5 per cent Potassium nitrate (KNO3) for 16-18 hrs and drying at room temperature over control or untreated seeds with two seed lots (Lot A-high vigour index ie.80% germination and Lot B-low vigour index ie 66% germination) in Factorial Randomized Block Design with four replications.

Treatments: 6 with 2 seed lots = 12
Number of replications: 4
Number of treatment combinations: 18
Plot size: 5.00m x 1.80m = 9.0 sq.m
Plot border: 1.0 m
Sub--irrigation channel: 0.5m
Field border-cum-main irrigation channel: 1.0m
Plot to plot distance: 0.5m
Distance between high and low germination plot: 1.5m

CULTURAL OPERATIONS AND SEED PRODUCTION TECHNOLOGY

Field preparation completed as one deep ploughing and cross horrowing followed by land levelling with the help of plank.The sowing lines were marked with the help of rope.The aged and without aged (control) seeds were treated with soybean culture and shade dried.The bio-fertilizer treated seeds were hand dibbled in earlier marked lines with a spacing of 30cm x 5cm. The recommended dose of NPK (20kgN,80kgP&40kgK) per hectare was applied as Di-ammoniumPhosphate(DAP)and Murate of Potash.The other necessory operations such as weed management,irrigation and plant protection measures were provided as and when required for crop husbandry of soybean. After full maturity,the seed crop was harvested manually by hand, dried up to a moisture level of 12 per cent and kept for seed quality assessment.The observations were recorded on crop stand parameters such as field emergence potential(%),survival of seedlings(%), final plant stand(%), days to 50% flowering, days to maturity and seed yield in kg/plot or kg/hectare.

Vigour index = Seed germination (%) x Mean seedling length (cm)

Before storage, seed standard parameters also analysed under laboratory conditions such as seed germination, seedling length, seedling dry weight in terms of dry matter production and seed vigour index. First of all, seed germination was tested with Between paper method (ISTA,1999).The randomly selected 400 seeds ie. one hundred seeds in each replication were uniformly spread on germination paper, rolled towels and kept in seed germinator at alternate temperatureof 20oc and 30oc for 7 days. Seed germination was recorded as first on 4th day as first count and on 8th day as final count.seedling performance was also observed as normal seedlings,abnormal seedlings,hard seeds and dead seeds which expressed in per cent on the basis of normal seedlings.Seedling length in terms of shoot length,root length and total length was measured individually on the basis of 10 normal seedlings which expressed in cm. Seedling dry weight was recorded on the basis of dry matter production.Regarding it, seedlings were dried in shade for 24 hrs ,transferred in hot air oven at 60+1oc for next 24 hrs and cooled in dessicator over silica-gel which expressed in g. Seed vigour index was calculated by formula of Abdul Baki and Anderson (1973) which expressed in number or numerical values.

Seed vigour index = seed germination (%) x seedling length (cm)

Statistical analysis of the data completed with suitable methods(Gomez and gomez,1983).Angular transformed values were applied wherever necessary before analysis the data for various determinations in present investigation.

RESULTS AND DISCUSSION

Soybean is a major oilseed crop in all over the world.In India, It is grown during kharif season.After harvest of the crop,the seed has to go under a series of processing and biochemical changes during the course of storage ie threshing to sowing.Optimum yield of all crops depend upon field emergence inspite of other agronomical and cultural practices. Pre-sowing seed treatment is always a good practice for better crop production and seed-plant- seed chain system.Since the loss of viability impairs the biological value of seed which protect and nourish the living cells of the embryo until a seedling is estabilished ,it assumes special significance.The farmers concerned with quality of seed because they want high germination ,vigorous seedlings and healthy crop. Also seedman is also concerned with the longivity of seeds because if germination drops below a certain minimum standards,the seeds are useless and suffers financial loss.The present investigation on pre-sowing seed treatment for invigoration and better esteblishment of soybean was undertaken to study the impact of seed priming on plant stand and seed quality of soybean.

The results of Table 1 reveal that pre-sowing seed treatment or seed priming as hydration with 50 ppm GA3 for 16-18 hrs and surface drying at room temperature was recorded significantly superior followed by hydration for 16-18 hrs and drying at room temperature below 25 to improve field emergence, speed of emergence,final plant stand potential, final stand plant,days to 50% flowering ,days to maturity, seed yield under field conditions. Similar treatments were also performed significantly superior to improve seed germination,seedling length in terms of shoot length, root length and total length, seedling dry weight in terms of dry matter production and seed vigour index.The findings of Andric et al.(1994); Gokhle et al.(2005);Parmesh et al.(2006) and Venkata et al.(2006) in Soybean as well as Jatav et al.(2006) in Chick pea was supported to the present findings.

Table 1.Effect of pre-sowing seed treatment on plant stand parameters under field condition

Table 1.1: Effect of pre-sowing seed treatment on field emergence potential (%) under field condition

S. No.	Treatment	Field emergence (%)			
		Lot A	Lot B	Mean	% change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	81.00 (64.16)*	69.50 (56.40)	75.20 (60.13)	+ 4.92
2	T2. 2.0% CaCl2 at room temperature	73.00 (58.69)	61.50 (51.60)	67.20 (55.06)	-6.39
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	82.75 (65.48)	71.25 (57.50)	77.00 (61.34)	+ 7.14
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	75.75 (60.50)	62.00 (51.90)	68.80 (56.04)	- 3.92
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	77.75 (61.85)	63.00 (52.54)	70.30 (56.98)	- 1.70
6	Control (Untreated)	78.00 (62.03)	65.00 (53.70)	71.50 (57.73)	
			S E (Diff.)	0.204	0.353
			C D (0.05)	0.415	0.718

*Figures in parentheses are transformed angular values.

Table 1.2 : Effect of pre-sowing seed treatment on speed of emergence under field condition

S.No.	Treatment	Speed of emergence			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	6.13	5.19	5.66	+ 15.16
2	T2. 2.0% CaCl2 at room temperature	5.29	4.42	4.85	- 0.61
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	6.33	5.50	5.92	+ 17.56
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	5.87	4.89	5.38	+ 9.29
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	5.44	4.63	5.29	+ 7.75
6	Control (Untreated)	5.31	4.45	4.88	
	SE	0.145	0.083		
	CD (0.05)	0.294	0.170		

Table1.3 : Effect of pre-sowing seed treatment on plant stand potential (%) under field condition

S. No.	Treatment	Plant stand potential (%)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	84.00	80.75	82.37	+7.89
2	T2. 2.0% CaCl2 at room temperature	75.50	64.75	70.12	-7.57
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	88.50	83.25	85.87	+11.6.
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	85.50	79.00	82.25	+7.75
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	75.50	64.25	69.75	-8.06
6	Control (Untreated)	80.75	71.00	75.87	
	S E (Diff.)	0.821	0.474		
	C D (0.05)	1.670	0.964		

Table1.4. Effect of pre-sowing seed treatment on plant stand per metre row under field condition

S. No.	Treatment	Plant stand per metre row			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	12.05	10.47	11.26	+12.00
2	T2. 2.0% CaCl2 at room temperature	9.20	7.87	8.53	12.90
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	14.70	13.32	14.01	+30.00
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	11.75	10.25	11.00	+10.90
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	9.50	8.75	9.12	-6.90
6	Control (Untreated)	10.67	8.92	9.80	
	S E (Diff.)	0.134	0.077		
	C D (0.05)	0.273	0.158		

Table1.5: Effect of pre-sowing seed treatment on days to 50% flowering under field condition

S.No.	Treatment	Days to 50% flowering			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	51.75	50.50	51.12	+2.60
2	T2. 2.0% CaCl2 at room temperature	41.00	39.25	40.12	-19.70
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	53.00	52	52.5	+4.70
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	47	44.75	45.5	-9.00
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	44.25	42.00	43.12	-13.70
6	Control (Untreated)	50.50	49.50	50.00	
	S E (Diff.)	0.348	0.201		
	C D (0.05)	0.708	0.409		

Table1.6: Effect of pre-sowing seed treatment on days to maturity (%) under field condition

S.No.	Treatment	Days to maturity(%)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	85.50	84.25	84.87	+10.40
2	T2. 2.0% CaCl2 at room temperature	74.25	72	73.12	-3.70
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	88.75	82.25	87	+12.60
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	79.50	78.75	79.62	+4.50
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	75.50	74.75	75.12	-1.15
6	Control (Untreated)	76.25	77.75	76	
	S E (Diff.)	0.460	0.265		
	C D (0.05)	0.926	0.540		

Table 1.7: Effect of pre-sowing seed treatment on seed yield per plot(Kg) under field condition

S. No.	Treatment	Seed yield per plot(Kg)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	1.59	1.51	1.55	+6.40
2	T2. 2.0% CaCl2 at room temperature	1.16	1.10	1.13	-22.00
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	1.68	1.55	1.61	+9.90
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	1.36	1.24	1.33	-10.30
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	1.40	1.31	1.35	-6.80
6	Control (Untreated)	1.52	1.37	1.45	
	S E (Diff.)	0.018	0.010		
	C D (0.05)	0.037	0.021		

Table1.8:Effect of pre-sowing seed treatment on seed yield (q/ha) under field condition

S. No.	Treatment	Seed yield (Q/ha)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	17.76	16.04	16.86	+4.30
2	T2. 2.0% CaCl2 at room temperature	12.91	12.21	12.56	-22.10
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	18.78	17.24	17.96	+10.10
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	15.13	13.85	14.49	-10.70
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	15.55	14.58	15.06	-6.60
6	Control (Untreated)	16.96	15.30	16.13	
	S E (Diff.)	2.863	1.653		
	C D (0.05)	5.824	3.362		

Table 2: Effect of pre-sowing seed treatment on seed characters under laboratory condition after harvest of soybean crop

Table 2.1: Effect of pre-sowing seed treatment on seed germination (%) under laboratory condition

S. No.	Treatment	Seed germination (%)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	84.50(66.82)	82.20(66.10)	83.30(65.96)	+2.00
2	T2. 2.0% CaCl2 at room temperature	75.20(60.34)	75.00(60.16)	75.10(60.25)	-7.90
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	89.00(70.90)	85.20(67.42)	87.00(69.16)	+6.21
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	79.70(63.27)	77.50(61.68)	78.00(62.17)	-4.40
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	80.70(63.98)	78.50(62.37)	79.60(63.17)	-2.40
6	Control (Untreated)	83.00(65.69)	80.20(63.62)	81.60(64.65)	
	S E (Diff.)	0.320	0.556		
	C D (0.05)	0.650	1.127		

S. No.	Treatment	Root length of seedling (cm)			
		Lot A	Lot B	Mean	% change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	6.26	6.14	6.2	+1.20
2	T2. 2.0% CaCl2 at room temperature	5.86	5.67	5.71	-6.80
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	6.47	6.38	6.43	+4.60
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	6.11	5.94	6.03	-1.60
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	6.20	5.87	6.04	-1.40
6	Control (Untreated)	6.19	6.07	6.13	
	S E (Diff.)	0.037	0.029		
	C D (0.05)	0.076	0.049		

Table 2.3: Effect of pre-sowing seed treatment on shoot length of seedling (cm) under laboratory condition

S. No.	Treatment	Shoot length of seedling (cm)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	5.72	5.66	5.74	+6.60
2	T2. 2.0% CaCl2 at room temperature	4.90	4.90	4.73	-10.20
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	5.86	5.75	5.80	+7.50
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	5.28	5.12	5.20	-2.90
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	5.35	5.12	5.23	-2.43
6	Control (Untreated)	5.42	5.30	5.36	
	S E (Diff.)	0.016	0.009		
	C D (0.05)	0.032	0.018		

Table2.4: Effect of pre-sowing seed treatment on seedling length (cm) under laboratory condition

S. No.	Treatment	Seedling length (cm)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	12.09	11.81	11.96	+3.90
2	T2. 2.0% CaCl2 at room temperature	10.63	10.30	10.47	-3.80
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	12.33	12.14	12.23	+6.80
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	11.39	11.07	11.23	-2.20
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	11.66	11.16	11.36	-1.10
6	Control (Untreated)	11.62	11.57	11.49	
	SE (Diff.)	0.051	0.025		
	C D (0.05)	0.104	0.060		

Table2.5: Effect of pre-sowing seed treatment on seed vigour index under laboratory condition

S. No.	Treatment	Seed vigour index			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	1021.50	971.60.	996.70	+2.80
2	T2. 2.0% CaCl2 at room temperature	807.20	775.20	791.20	-15.70
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	1100.60	1036.30	1067.90	+12.00
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	908.70	857.90	883.40	-5.80
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	933.70	879.70	906.70	-2.40
6	Control (Untreated)	964.30	913.00	938.70	
	S E (Diff.)	8.614	4.973		
	C D (0.05)	17.47	10.09		

Table2.6: Effect of pre-sowing seed treatment on dry matter production of seedlings (g) under laboratory condition

S. No.	Treatment	Seedling weight (g)			
		Lot A	Lot B	Mean	%change over control
1	T1.Hydration for 16-18 hrs and drying at room temperature below 25oc	0.5534	0.5320	0.5430	+2.50
2	T2. 2.0% CaCl2 at room temperature	0.5161	0.5060	0.5700	-3.50
3	T3.Hydration with 50ppm GA3 for 16-18 hrs and surface drying at room temperature	0.5630	0.5510	0.5570	+4.90
4	T4.Hydration for 16-18 hrs and drying at room temperature below 25oc followed by dressing with Thiram@ 0.25%	0.5230	0.5170	0.5200	-1.70
5	T5.0.5%KNO3 hydration for 16-18 hrs at room temperature	0.5220	0.5880	0.5150	-2.60
6	Control (Untreated)	0.5356	0.5220	0.5280	

S E (Diff.)	0.001	0.002
C D (0.05)	0.003	0.005

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INFLUENCE OF INTERCROPPING ON ROOT-GALL NEMATODE DISEASE ON SOYBEAN (GLYCINE MAX L. AND MERRIL)

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ABSTRACT :

Six intercrops (maize, water melon, okra, bitter gourd , Amaranthus and red pepper) were tested for control of root-gall nematode disease on soybean in a loamy sand soil naturally infested with Meloidogyne javanica. The experiment was laid out in a randomized complete block design replicated four times. Results based on root-gall indices and number of juveniles (J_2) recovered from roots and rhizospheric soil showed that intercropping soybean with, red pepper and Amaranthus effectively suppressed infection on soybean roots. Okra, maize, bitter gourd and water melon, intercropped with the soybean aggravated root-gall damage and caused yield reduction.

Keywords: Disease, intercrop, nematode, root-gall, soybean.

Soybean is the cheapest source of dietary plant protein (Judd, 1970). It produces the highest yield of protein per unit land area and has the ability to succeed on nearly all soils (Perman, 1982). The crop is usually grown sole and suffers a great deal of nematode damage which has led to some farmlands being abandoned to some parasitic nematodes (Lehman, 1978). Total crop failure in soils heavily infested with root-gall nematode (*Meloidogyne spp)* has also been reported (Agu, 2006). A number of control methods and practices have however, been developed. These included: inclusion of non-hosts in rotation sequence (Adesiyan et al, 2000), introduction of resistant varieties (Odihirin, 1981); heat and chemical treatments (Adesiyan et al, 2000); use of biological control agents (Adesiyan, 1985) and the use of organic manures (Egunjobi and Onayemi, 1981 and Amosu, 1981). The success and adoption of any one of these methods however depends mainly on the level of expertise and socio-economic conditions of the farmers.

In India, root crops, cereals, legumes and vegetables are grown together in mixtures in various combinations. Besides yield advantages (Wahua et al, 1981) mixed cropping systems also provide an effective strategy in controlling nematode pests of agricultural crops (Idowu and Fawole, 1991). This is by intercropping a susceptible crop with non-host crops. Information on crop mixtures for effective control of soybean root-gall nematode is lacking. This study was therefore concerned with the evaluation of different soybean based intercrops for effective control of root-gall nematode disease on soybean.

MATERIALS AND METHODS

The study was conducted at the Department of Horticulture ,Kulbhasker Ashram Post Graduate College ,Allahabad in the year 2013-14. The soil was loamy sand and naturally infested with root-gall nematode, *Meloidogyne javanica*. By sieving and Bearmann's funnel technique (Viglierchio and Schmitt, 1983), the nematode population density in the soil was estimated.

Before planting, the land was cleared and made into mounds (2 x 1 m) according to farmers'

practice and laid out in a randomized complete block design with four replications on a 20 x 25 m plot size. Soybean cv. Laxmi, moderately susceptible to M. javanica (Awolola, 1987); Okra cv. Pusa Sawani; Water Melon cv Madhu , Bitter gourd cv Small Green; Maize cv. Deccan; Red pepper cv. Jwala and Amaranthus cv. Harit Local were combined as follows: soybean/ water melon/maize/okra; soybean / maize / okra / Amaranthus; soybean / red pepper / water melon / Amaranthus; soybean / water melon / Amaranthus / red pepper; soybean / water melon / maize /bitter gourd melon; soybean / pepper / water melon / okra and interplanted the same day on the mounds using the sole populations of each (soybean, 240,000; okra, 37,037; water melon, 10,000; bitter gourd , 10,000; maize, 20,000; red pepper, 17,778 and Amaranthus, 222,222 / ha, (Unanma et al, 1991). In each crop mixture, soybean was sown 2 seeds / hole on crest and the intercrops planted 15 cm away from soybean and in alternate arrangement. Mounds planted with sole soybean served as control.

Compound fertilizer NPK 15:15:15 at 400 kg/ha was applied after first hoe-weeding (i.e. 3 weeks after planting) and second weeding done 10 weeks after planting. Twelve weeks after planting the crops were carefully lifted from soil and the crops separately washed free. The roots were examined and rated for galls on a scale of 0 to 4 according to Ogubji (1981) in which 0 = no infection (no galls present); 1 = rare infection (1 – 3 galls present); 2 = light infection (4 – 10 galls present); 3 = moderate infection (11 – 30 galls present) and 4 = severe infection (≥ 30 galls present). Juveniles second stage (J_2)/2 g of plant root system were extracted by the jar incubation method (Ayoub, 1977). Juveniles/120 cm^3 of soil were also extracted using a modified Bearman funnel technique (Tray method) (Hooper, 1969). The nematodes from roots and soil were counted using a dissecting microscope.

Data collected on soybean also included: number of harvested pods/plant, number of grains/pod; shoot weights (fresh and dry); grain yield/ha and root dry weights. These data were subjected to analysis of variance (Steel and Torrie, 1981) and significant differences between means separated by Fisher's least significant difference method (Fisher, 1948) at P = 0.05.

RESULTS AND DISCUSSION

Crops roots rated for galls showed that the intercrops differed in host status to *M. javanica* (Table 1) and can be grouped as follows: (i) highly susceptible: okra water melon, bitter gourd; (ii) moderately susceptible: maize ; (iii) moderately resistant: red pepper and (iv) highly resistant: Amaranthus. The intercrops influenced root-galling on soybean (Table 2). Severe root-galls occurred on soybean plants intercropped with okra, maize and melon; also with bitter gourd, melon and maize as well as with maize, okra and Amaranthus. Moderate root-galls occurred on the soybean when intercropped with melon, Amaranthus and pepper. Pepper, Amaranthus and bitter gourd intercrops suppressed gall formation on the soybean.

These results showed that okra, maize and melon are not good crop associates with soybean in *M. javanica* infested soils. This observation agrees with Bridge (1978) who noted that planting susceptible crops alongside yam plants could increase nematode population density and the severity of damage by root-gall nematode (*M. incognita*) on yam plants. Atu and Ogbuji (1986) also reported that susceptible intercrops planted on yam mounds resulted in greater root-gall damage on the harvested tubers.

Rare root-galls on soybean caused by resistant red pepper and Amaranthus and

intercrops was because these intercrops prevented nematode population increase around the soybean plants (Table 2). Fawole and Mai (1979) reported that gall indices corresponded with nematode population density.

Soybean yields varied with galling responses at different crop mixtures (Table 3). Significantly higher number of pods/plant were produced by soybean plants intercropped with red pepper, Amaranthus and bitter gourd with low gall index. Grain yield (tons/ha), fresh shoot weight and number of grains/pod consistently decreased with increases in galling response at the various crop mixtures. These decreases were significant on soybean plants intercropped with two or more of the intercrops susceptible to the root-gall nematode (*M. javanica)*. This was due to significant increases in galling response at significantly increased nematode population attacking the soybean (Table 2). Galls are known to decrease the uptake of minerals, especially, N, P and K (Trudgill, 1987) and also do not translocate adequate water and nutrients to vegetative organs for photosynthesis (Otiefa and Elgindi, 1962).

Soybean root dry weights increased as galling response increased with increasing number of intercrops susceptible to the root-gall nematode (Table 3). This was because of the weight gain on the main roots caused by galls. Agu (2002) found that galled roots represented most of the total weight of the root system.

From this study, it is obvious that root-gall nematode disease on soybean can be effectively controlled and good grain yields obtained in *M. javanica* infested soils if bitter gourd , red pepper and Amaranthus were used as intercrops. Bitter gourd , pepper and Amaranthus are therefore recommended as intercrops for effective control of soybean root-gall nematode disease in soils infested with *M. javanica*.

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Table 1 : Host status of intercrops collected from around *M. javanica* infected soybean.

Sl.no.	Intercrop	Mean Soybean root gall indices (0-4)	Host status to *M. javanica*
1.	Okra cv. Pusa Savani	3.90	Highly susceptible
2.	Water melon cv. Madhu	3.10	Highly susceptible
3.	Bitter gourd cv. Small Green	3.10	Highly susceptible
4.	Maize cv. Deccan	2.90	Moderately susceptible
5.	Red pepper cv. Jwala	1.52	Moderately resistant
6.	Amaranthus cv.Harit Local	0.23	Highly resistant
7.	$LSD_{0.05}$	1.00	

Table 2 : Root gall indices , number of *M. Javanica* juvenile (J2) recovered from roots and rhizopheric soil of soybean alone and in association with other intercrops.

Sl.no.	Crop mixture	Mean Soybean root gall indices (0-4)	Juvenile population (J_2) Per 2 g root system	Juvenile population (J_2) per 200 cm3 soil
1.	S/RP/BG/A	0.40	12.01	42.02
2.	S/RP/BG/O	2.20	45.02	54.25
3.	S/WM/A/RP	3.00	145.06	124.41
4.	S/BG/M/WM	3.63	206.23	245.01
5.	S/M/O/A	3.63	306.86	234.20
6.	S/WM/M/O	3.63	325.63	321.02
7.	Soybean sole (control)	2.02	155.02	120.11
8.	LSD $_{0.05}$	1.02	54.02	62.36

S=Soybean, RP= Red pepper, BG=Bitter gourd, A=Amaranthus, O= Okera, M=Maize, WM= Water melon.

Table 3 : Soybean yield as affected by intercrops and root gall nematode infection

Sl.no.	Crop mixture	Mean Soybean root gall indices (0-4)	Pods/plant (No.)	Seeds/pod (No.)	Grain yield (t/ha.)	Shoot fresh weight (g)	Shoot dry weight (g)	Root dry weight (g)
1.	S/RP/BG/A	0.40	21.22	3.56	3.75	10.12	3.01	9.17
2.	S/RP/BG/O	2.20	15.27	3.65	2.89	10.01	3.85	10.24
3.	S/WM/A/RP	3.00	13.56	2.89	2.56	9.23	3.60	13.80
4.	S/BG/M/WM	3.63	10.74	2.16	4.53	8.78	4.63	16.15
5.	S/M/O/A	3.63	9.62	2.72	4.72	8.62	4.72	15.89
6.	S/WM/M/O	3.63	10.65	1.26	6.59	8.72	6.89	18.12
7.	LSD $_{0.05}$	1.02	3.95	1.56	2.08	0.52	2.03	3.45

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GROWTH AND YIELD OF CAJANUS CAJAN CV. UNDER THE INFLUENCE OF POLLUTED WATER IRRIGATION

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ABSTRACT

A pot experiment was conducted to study the effect of irrigation with polluted water on growth & yield of *Cajanus cajan cv.* Sterilized seeds of *Cajanus* plant were sown in normal (control set i.e. soil irrigated by tubewell water) and polluted soils (i.e. soil irrigated by polluted water taken from two different sites).Decreased growth and yield were reported in plants, irrigated with polluted water taken from first site while irrigation from polluted water taken from second site showed promotery effects on growth and yield of test plants compared to control.

The pigeon pea (*Cajanus cajan* L.) also known as toor dal or arhar dal is a member of the family Fabaceae. Pigeon peas are both a food crop (dried peas, flour, or green vegetable peas) and a forage/cover crop. They contain high levels of protein and the important amino acids methionine, lysine, and tryptophan.

Keywords : Toxic effect, growth, irrigation

Environmental pollution has become a serious problem, at present. Emitted effluents and solid wastes from various industries have increased the amount of contaminants in air, water and soil to hazardous level in many areas. Polluted water consists of industrial discharged effluents, sewage water and the rain water. The use of this type of water is a common practice in agriculture. Moreover, indiscriminate use of insecticides, herbicides, pesticides and some other chemicals used for plant protection and allied purposes have also led to their accumulation to damaging concentration in the organisms of the higher tropic level. Recent surveys across 50 cities in Asia, Africa and Latin America show that wastewater irrigation is a common reality in three-fourths of the cities. Using wastewater or polluted water sources without adequate safeguards raises obvious potential health risks for farmers and consumers while the actual risks depend on many factors like the living conditions of the exposed population. Most studies show clear links between wastewater irrigation and the health of exposed farming households. There is also considerable evidence showing the impact on soil and groundwater through high nutrient levels, salts, or heavy metals.

MATERIALS AND METHODS

To study the effect of irrigation with polluted water on growth & yield of *Cajanus cajan cv.*, seeds of *Cajanus cajan* cv. Bahar were selected on the basis of uniformity in size, shape and weight. Selected seeds were sterilized with 0.1 % mercuric chloride solution and thoroughly washed with distilled water. For experiments, water from two polluted sites were taken .The first polluted site (nala) is situated beside the Parmar Auto Agency & Service Station , Jaunpur at mohalla Parmanatpur. This nala is polluted by petrochemicals and industrial effluents. The second polluted site

(nala) is situated at mohalla Chachakpur, Jaunpur. This nala is polluted by industrial effluents as well as by sewage sludge. It is a rich source of nutrients also. The crops were grown in normal (control, i.e., soil irrigated by tube well water) as well as in polluted soils (i.e. soil irrigated by polluted water taken from two different sites). Growth characters were analyzed after seventy days and yield characters were analyzed after one hundred and ten days of radicle emergence. Average of twenty plants was taken for readings.

RESULTS AND DISCUSSION

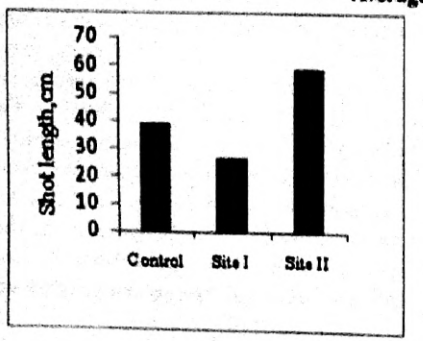
Growth and yield analysis of *Cajanus cajan* cvs. Bahar are shown in table-1 & Fig.-1.

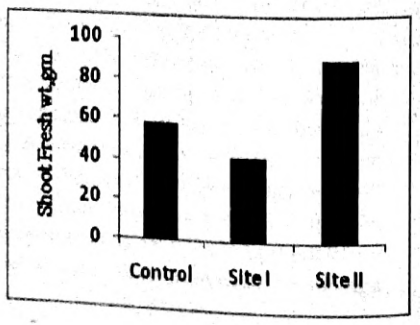
It was reported that growth & yield of

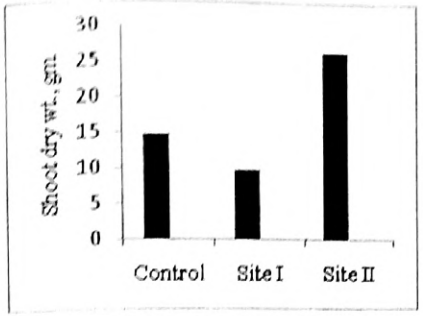
Table - 1 : Effects of polluted water irrigation on C. cajan cv. Bahar

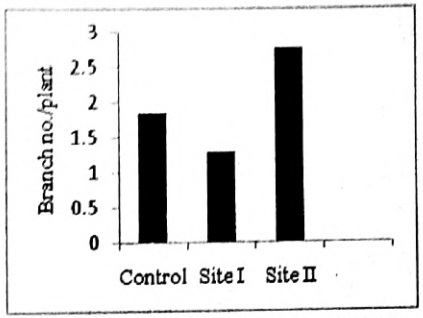
S.no.	Parameter	Control	First Site	Second Site
1-	Shoot length, cm.	39.43	26.81	59.15
2-	Shoot fresh weight, gm	58.29	42.55	90.09
3-	Shoot dry weight, gm.	14.75	9.74	26.55
4-	Branch no./plant	1.85	1.29	2.78
5-	Root fresh weight, gm.	12.23	7.58	20.79
6-	Root dry weight, gm.	3.01	1.81	5.69
7-	Leaf no./plant	33.47	21.09	50.53
8-	Nodule no./plant	18.34	8.25	23.84
9-	Pod no./plant	418.84	293.18	565.43
10-	Seed no./Pod	4.97	3.73	6.98
11-	Seed dry weight, mg.	140.01	99.41	183.42
12-	Seed yield/ plant, gm.	291.44	107.83	719.86

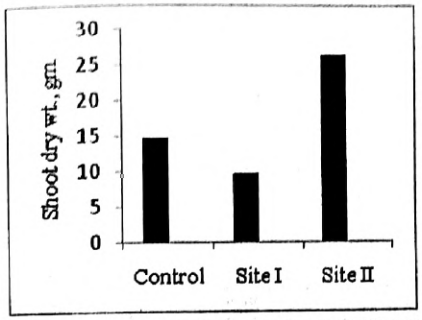
Average of 20 plants

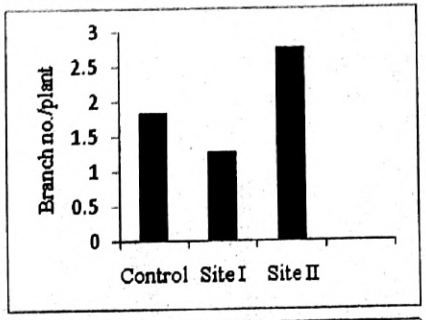


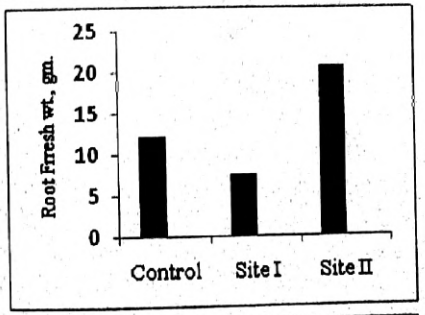


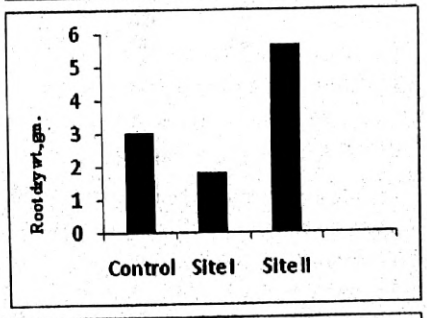


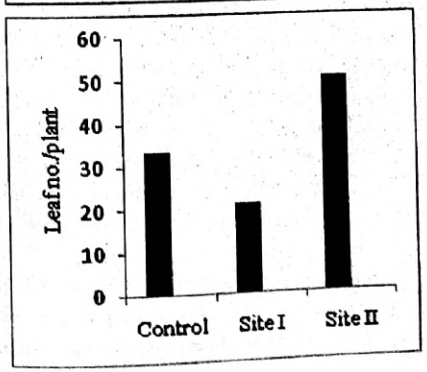


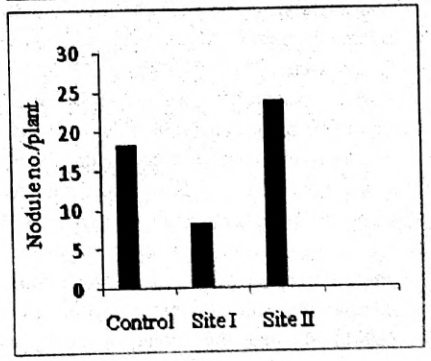












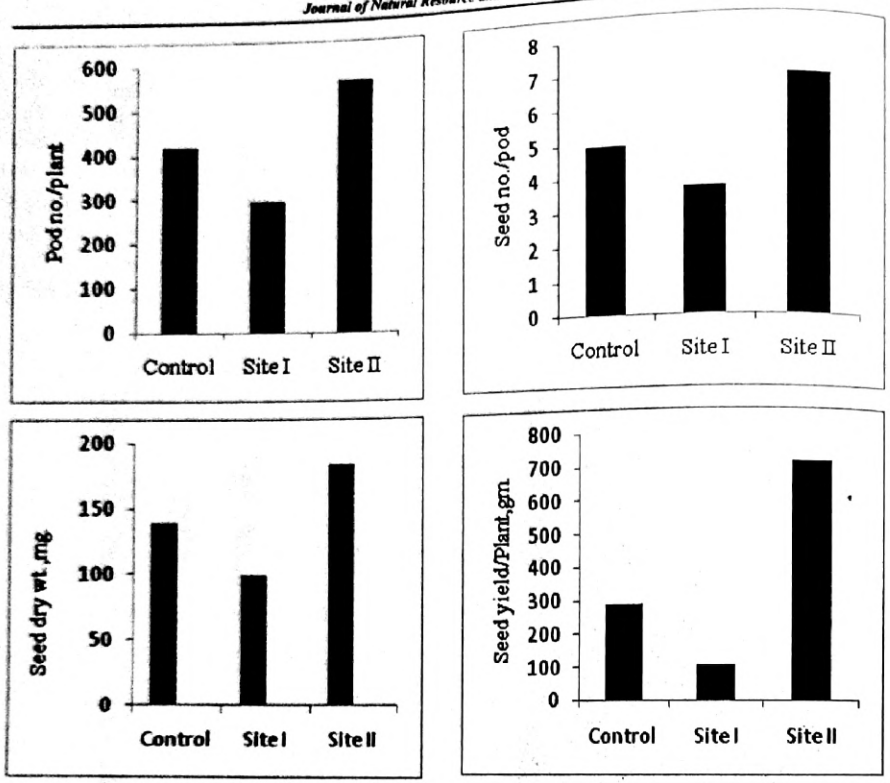


Fig.-1: Effects of polluted water irrigation on C. cajan cv. Bahar

test plants decreased when irrigated by polluted water taken from the first site compared to the control. Root fresh weight & dry weight of Cajanus were inhibited by 38% & 40% respectively, compared to control while Branch number, Shoot length, fresh weight & dry weight were 30%, 32%, 27% & 34% lower than control respectively. Leaves number & nodule number of plant were inhibited by 37% and 45% compared to control. Pod no. /plant & seed no. / pod were 30% & 25% lower than control respectively. Air dry weight / seed and total seed yield / plant were 29% and 63% lower than control respectively. Our observations are comparable to the earlier investigators. Liu et al. (2001) showed the effect of heavy metal accumulation in maize (Zea mays L.). They reported that root growth with fresh and dry weight decrease progressively with increasing concentration of Cu+2 in solution. Shoot growth with fresh and dry weight decrease progressively when leaves were treated with increasing concentration of Cu+2 in solution. Inhibitory effects of polluted water on the growth of leguminous plants (P. satium, P. mungom & V. faba) was observed by Singh U.K. (1994). Peralta et. al. (2001) investigating the effect of heavy metals on alfa alfa (Medicago sativa L.) reported stimulated seed germination, root and shoot elongation at 5 ppm but at higher concentration of 40 ppm there was reduction in the seed germination and root and

shoot growth. Our observations are also comparable to other investigators (Swaminathan et. al. (1991), Davies M.A., et.al, 2001).Reduction in growth & yield was probably due to the presence of high concentration of toxic heavy metals. First site was polluted by petrochemicals & industrial effluents. Prior to establishment of Auto Service Station the water body had promotery effects on growth & yield of crop plants but at present due to discharge of petrochemicals by service station into the water bodies, water has become inhibitory for growth & yield and there is danger in future that it may become lethal.

Irrigation with polluted water taken from second site increased the growth & yield of test plants markedly compared to control. Root fresh weight, root dry weight, branch number, shoot length, fresh weight and dry weight of plant irrigated by polluted water were much more than controls as these were 170%, 189%, 150%, 150% ,158% and 180% of control respectively. Leaves number & nodule number of plant were 151% & 130% of the control respectively. Pod no./plant , air dry weight / seed & seed no./ pod were also more in plants irrigated by polluted water than controls as these were 135%, 131% & 140% of controls respectively , while seed yield / plant was 247% of control. Linnman et.al. (1973) reported that the application of sewage sludge increased the yield of wheat accompanied by increase in Cd contents in plant parts including grains .Growth promotion and accumulation of heavy metals by irrigation with polluted water were reported by Banerji & Kumar (1979) in D. carota & Z. mays. Valdare et. al. (1983) found that the application of sewage sludge poor in heavy metals increased the growth & yield of B. vulgaris while decrease in the yield was noticed when irrigated from polluted water rich in heavy metals. These finding are also in agreement with earlier reports of Srivastava and Sahai (1987), Veer and Lata (1997), Wahid A., et.al. (2000), Singh P., et.al. (2000, 2010, 2011, 2012) and Hussain F., et.al. (2010).

Present study on irrigation with polluted water taken from two different sites shows different effects on growth & yield of Cajanus. cajan cv. Bahar. Irrigation from polluted water (rich in nutrients and poor in heavy metals) increased the growth & yield of test plants while polluted water rich in toxic heavy metals & industrial effluents inhibited the same. All polluted water contains plant nutrients and also organic matter other than high concentration of soluble salts and heavy metals .Farmers use polluted water to save their expenses. Harmful effects can last for several years due to extensive irrigation of polluted water so it can not only leach down the soil but also has a negative effect on ground water quality. Some water pollution effects are recognized immediately, whereas others don't show up for months or years. Thus, better growth & yield of plants irrigated by polluted water constitute a deceptive type of pollution and requires spreading of awareness amongst both the farmers and consumers through extension of educational programmes. Besides this the industrial wastes & municipal sewage should be properly treated before being let into the water bodies to prevent contamination.

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PHYSICO CHEMICAL STUDY OF GROUND WATER OF DIFFERENT TEHSIL OF TONK, DISTRICT OF RAJASATHAN, INDIA

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ABSTRACT

This paper show the physico chemical study of ground water of different Tehsil of Tonk district. Four different ground water samples from Deoli Bazar(DB) of Deoli ,Newai Bazar(NB) of Newai ,Malpura Railway-crossing (MRC) of Malpura and Todraising Railway-crossing(TRC) of Todraisingh have taken during Jan 2014-June 2014 and analysed. The values obtained were compared with standards prescribed by WHO & ISI1050091. In the present study three water samples were within the limit. One water sample showed T.D.S., TH, Cl, TA, F and low DO values indicating poor water quality, The significance of the results is further discussed.

Keywords: Turbidity, physicochemical parameters, ground water pollution, electrical conductivity.

Water is important covalent compound which is present in liquid form. It is well knows universal solvents and it is essential for the survival of all living being. Industrial waste, domestic waste and the municipal solid waste is one of leading causes of pollution of surface & ground water. Contamination of water resources available for household and drinking purposes with heavy elements, metal ions and harmful microorganism is one of the serious health problem (APHA,1989). The rapid growth of urban areas has further affected. The ground water quality due to over exploitation of resources and improper waste disposal practices (Baligar and Chavadi, 2004; Manivaskam, 2005). Considering above aspects of ground water contamination the present study was under taken to investigate the possible impact of the ground water quality.

In Tonk ground water occurs mostly under phreatic conditions. In alluvial areas, ground water generally occurs under water table conditions where as in hard rock and crystalline rocks, it is under slight pressure. The weathered zone below the water table acts good storage for ground water. The movement of ground water is controlled by the weathered zone, joints, fissures, fractures, bedding planes and other structurally weak zones in hard rock and grain size distribution in alluvium. The movement is further controlled by the extent, size, openness, continuity and interconnection of fractures. Quaternary Alluvium, Phyllites Schist, and Granitic- gneisses are the major hydro-geological formation in the district.

Study Area:

Tonk district of Rajasthan is situated on National Highway No. 12 at distance of 100 km from Jaipur. It is located in Northeastern part of the state between 75.19' and 76.16 East longitudes and 25.41' and 26.24' North Latitude. The total area of the district is 7194 km^2.

Newai is major tehsil of Tonk district. Deoli, Malpura and Todaraising are other tehsil of Tonk District. Deoli Bazar(DB) of Deoli, Newai Bazar (NB) of Newai,Malpura Railway-Crossing (MRC) (Malpura and Todaraising

Railway-Crossing(TRC)of Todraisingh are different sites of Tonk District. The people are using ground water as well as municipal water for daily need in this region. The present investigation was carried out by selecting four sites of different tehsils of Tonk district.

MATERIALS AND METHODS

Water samples were collected from four sampling points of different locality of Tonk district during periods of six months Jan 2014-June 2014. The sampling points & places were given in Table-1.

Table - 1 : Sampling points and places

S. No.		
1.	Newai Bazar (D.B.)	Ground water
2.	Deoli Bazar (N.B.)	Ground water
3.	Malpura Railway Crossing (MRC.)	Ground water
4.	Todaraising Railway Crossing(TRC)	Ground water

Water samples were collected in plastic canes of 3 liter capacity as per standard procedure, Electrical Conductivity (E.C.), Total Dissolved Solids (T.D.S.), Turbidity, Dissolve Oxygen (D.O.), Total Alkalinity (T.A.), Total Hardness (T.H.), Calcium (Ca^{++}), Magnesium (Mg^{++}), Sodium (Na^{+}), Potassium (k^{+}), Chloride (Cl^{-}), Sulphate ($SO4^{--}$), Nitrate ($NO3^{-}$) were determined using standard method by Patil et. al.,(2001), Purandara et. al., (2003) and Sriniwasa & Venkateshwara, (2000). Reagents used for the present investigation were A.R.Grade and distilled water was used for preparing various solutions.

RESULTS AND DISCUSSION

The average values of physico chemical parameters during Jan 2014-June 2014 are presented in Table-2. The pH is a measure of the intensity of acidity or alkalinity and gives the concentration of hydrogen ions in water. It has no direct adverse effect on health, but a low value below 4.0 gives sour taste & higher value above 8.5 shows alkaline taste by Singh (2006). In the present study the pH values of water samples vary between 5.8 to 7.2 and were within limit prescribed by WHO.

Electrical conductivity (E.C.) value signifies the amount of total dissolved salts. An EC value varies from 500 to 2831 µmho/cm which reveals that EC values for all samples were in the prescribed limit. The EC value for sample D (500) was found minimum. The sample A has highest EC values. Total dissolved solids (T.D.S.) indicate the general nature of water quality or salinity. Water containing more than 600 mg/l of TDS is not considered desirable for drinking water supplies, but in unavoidable cases 1500 mg/l is also allowed (Reddy,1981). In the Present investigation, TDS values varied from 210 to 1190 mg/l. It shows that sample A have higher value than the prescribed limit given by ISI 10500-91. The highest TDS value in sample A may due to sewage pond near the sampling points. Sample C&D have lower values than the prescribed limit ISI 1050091.

Turbidity of water is actually the expression of an optical property (Tyndall effect) in which the light is scattered by the particles present in water. Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individuals' particles that are generally invisible to the naked eye. The measurement of turbidity is a key test of water quality. Turbidity make the water unfit for domestic purposes, food & beverages industries and many other industrial uses. High turbidity value of water has show more pollution in water. In the present study the turbidity values varies between 4.9 to 8.4 NTV and turbidity of three sample were within the limit prescribed by ISI 10500-91.Sample A have high turbidity value(4.9NTV) which were out of the limit prescribed by ISI 10500-91.

Dissolved oxygen (DO) is one of the important pollution parameters in water quality assessment and reflects the physical and biological processes prevailing in the water. The DO values indicate the degree of pollution in water bodies. In present investigation, DO value varies between 2.8 to 7.1. The results indicate that the DO is not depleted except sample A which showed low DO value indicating heavy contamination by organic matter.

The alkalinity of water is measure of its capacity to neutralize acids. The alkalinity in water is caused by carbonates, bicarbonates and hydroxide. Total alkalinity value for A, B, C samples (580,590 & 610mg/l) was found to be greater than the values prescribed by W.H.O.

Hardness of water mainly depends upon the amount of calcium or magnesium salts or both. Hardness of water is objectionable regarding water use for laundry & domestic purpose, since it consume a large quantity of soap. In the present study total hardness value varies from 266 to 990 mg/l. The values for A, B,C & D samples were higher than the prescribed limit.

The amount of calcium varies from 30.00 to 125.0 mg/l. and the magnesium content is regarding between 29.30 to 190.0 mg/l. which is found within the prescribed limit except sample D below prescribed limit and sample A above prescribed limit. Sodium (Na^{+}) concentration varies between 48.0 to 70.0 mg/l. Potassium concentration varies from 0.63 to 2.5 mg/l in which no standard values are suggested for drinking by WHO & ISI 10500-91.

Chloride imparts salty taste if present in excess (>250 mg/l). People in take to high chloride in water are subjected to laxative effect (Trivedi and Goel,1986). Chloride presence in study area ranges from 90.20 to 475.5 mg/l. Only the sample 'D' was found within prescribed limit. The sulphate content varies between 29.13 to 91.20 mg/l and the nitrate content varies between 0.078 to 0.148 mg/l. The sulphate & nitrate values were found within the prescribed limit. In all samples values of fluoride is so high (4.0,3.9,3.5&3.0mg/l) than the prescribed limit (1.0-2.0mg/l) of WHO.

CONCLUSION

Deviation is shown by hand pump water from the standard (WHO) indicating that ground water is polluted. The causes of pollution appear to be sewage & industrial effluents. The quality of water in the sample A is inferior compared to other water samples probably due to sewage pond, domestic waste water and industrial effluent is very close to hand pump. The water sample (A) is highly polluted and unfit for drinking purpose. Similar results were obtained by Dahiya & Kaur(1999), Manivaskam (2005) Suman & Sharma(2010) & Suman (2015).

Table – 2 : Average Value of Physico- chemical Parameters of Drinking Water with Standard Parameter (Jan 2014 to June 2014)

Sl. No.	Parameters	Sampling Points				WHO 1993		ISI 10500-91	
		A	B	C	D	Min	Max		
1	PH	5.8	6.4	7.1	7.	6.7	7.7	6.5	8.5
2	EC	2851	1690	1620	500	466	2914	1400	-
3	T.D.S.	1190	600	500	210	160	1080	1000	500
4	Turbidity	8.9	6.4	4.5	4.9	3.8	8.6	-	-
5	DO	2.8	6.0	7.3	7.1	2.7	8.2	-	-
6	TA	580	590	610	180	140	614	120	200
7	TH	990	683	601	266	168	922	500	300
8	Ca^{++}	125.0	100.0	90.00	30.00	25.65	117.8	100	75
9	Mg^{++}	190.00	80.00	70.11	29.30	25.34	153.2	150	30
10	Na^{+}	70	54	70	48	15	73	200	200
11	K^{+}	0.63	0.76	2.40	2.50	0.6	3.4	-	-
12	Cl^{-}	475.5	350	300	90.20	69.02	477.5	250	250
13	SO_4^{--}	90.10	50.20	60.40	29.13	39.73	93.39	250	200
14	NO_3^{-}	0.148	0.095	0.081	0.078	0.035	0.158	45	45
15	F^{-}	4.0	3.9	3.5	3.0	1.0	2.0	-	-

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FEEDING MANAGEMENT PRACTICES FOLLOWED BY THE LIVESTOCK FARMERS IN FATEHPUR DISTRICT OF CENTRAL UTTAR PRADESH

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ABSTRACT

Good quality high nutritious roughage with low concentrate is essential and economical for increasing the production and quality of milk. The present investigation was conducted among 150 randomly selected livestock farm families, comprising of fifteen each from ten villages of five development blocks of Fatehpur district which lies in between Ganga and Yamuna rivers. Study revealed that green fodder cultivation was very low (24.66%) because paddy-wheat is predominant cropping system in the area and wheat/rice straws are the basal feed of dairy animals. None of the farmers fed single fodder; *adlib* green feeding was not practiced. Dairy farmers fed green legumes as well as non-legumes along with other fodders. Majority (54.66%) of the farmers fed roughage *adlib*. 76.50 percent of respondents practiced chaffing of roughage before feeding and majority (81.5%) followed regular grazing on harvested/fallow field and road sides. Traditional system of livestock rearing with grazing on fallow/harvested fields along with sani with locally available roughages and concentrate/wheat flours prior to milking was the most common feeding practices. There is a tremendous scope of scientific feeding management practices with available feed and fodder resources for optimum and economical production.

Keywords: *Feeding practices, feed, fodder ,fatehpur sani and livestock farmers.*

Livestock has traditionally been an integral part of our agrarian economy, consuming the crop residues and providing manure as well as animal energy for tillage and haulage, Dairying has been inherent in Indian culture for centuries, milk and milk products have always been an integral part of our food consumption habits, since the time of Lord Krishna. The huge livestock resources in the country are primarily distributed in tiny and small holdings providing food, employment and sustenance.

Livestock sector has been considered an important agrarian activity for rural livelihood and employment since centuries, it still plays a crucial role in shaping the rural economy and is a major continuous income generating activity for the rural mass. India with 140 MT milk produced by its 75 million dairy farmers continues to be the largest producer of milk in the world. Uttar Pradesh, India's most populous state, with 68715147 livestock a part of relatively more advanced regions, being the

highest milk producing as well as milk consuming state of our country. Fatehpur district lies between the parallel of 35-26°. and 26-16°. north latitude and between 80-14°. and 81-20 °. east longitude spreading about 104 km from west to east and 40 km from north to south in between two holy rivers Ganga and Yamuna flowing in north and south, respectively.

MATERIALS AND METHODS

The present study was conducted in Fatehpur district of Central U.P. which falls under central plain (agro-climatic) zone-V of the state. The district Fatehpur comprising of thirteen development blocks falling under three talukas/tehsils namely Sadar, Bindki and Khaga. Out of the total thirteen blocks, five development blocks namely – Airayan, Hathgaon, Hanswa, Malwa and Teliyani were purposely selected for detailed investigation as the first stage sampling unit. Under the second stage in sampling plan two village from each block and fifteen livestock farm families from each village comprising three farmers of each of five categories i.e. landless, marginal farmer (2.50 acre), small farmer (5.0 acres) medium farmers (up to 15.0 acre) and large farmers (>15.0 acres) and thus a total of 150 respondents were selected randomly for collection of required information. Multistage stratified random sampling technique was adopted for selection of sample household. The desired information was collected in the purposely developed and pre-tested schedules and questionnaires through personal interview technique along with secondary sources and observations. Thus the data collected from 150 respondents were analyzed statistically.

RESULTS AND DISCUSSION

The data regarding type of feed and system of feeding revealed that jowar/maize. sudan chari + lobia, bazra, green grasses with bhusa in Kharif (rainy season); berseem, green mustard with bhusa/paddy straw, oat, dry kadbi in Rabi (winter season) and moong, sudan chari, with bhusa along with gram and lentil residues were mainly fed to animals during Zaid (summer season).

The data regarding feeding practices of dairy cattle and buffaloes in the study area revealed that due to lack of quality pasture lands in the study area, feeds and feeding practices were almost similar among all the categories of farmers, with very slight difference in quantity of fodders fed to the animals during Kharif, Rabi and Zaid. Green fodder cultivation round the years is very low (24.66%) because rice-wheat is a predominant cropping system, wheat and paddy straw are the basal feed of dairy animals. Dhiman (1988) reported that 23.75 percent farmers fed green fodder throughout the year, which is in agreement to R.K. Singh *et al.*, (2013) and present findings. Whereas, contrary to reports of Kumar and Mishra (2011). None of the respondents fed single fodder, as they fed fodders in combination of two or more roughages to their animals.

Adlib green feeding was/not practiced, but majority of them fed green legumes as well as non-legumes along with other available fodders. Findings of Panwar (1992) and Rathore (2009) who reported 34.25 percent farmers cultivated and fed green fodder to their buffaloes round the year, are contrary to the finding of present study and in consonance to Swaroop *et al.* (2014).

Regarding roughage feeding data revealed that majority (54.66%) of the respondents fed roughage *adlib*. 76.50 percent of respondents practiced chaffing of roughages before feeding rest fed without chaffing. The results of the present study are in line with the

findings of Panwar (1992), Rathore (2010), Rangamma *et al.*, (2013) and Swaroop *et al.*, (2014), whereas it is contrary to Kumar and Mishra (2011) and Singh, *et al.* (2013) who reported 17.50 percent in case of cow rearing and 25.01 percent in case of buffaloes keepers. The usual ratio of dry and green fodder of 1:1 was followed by 38.0 percent respondents, whereas 47.50 percent practiced 2:1, ratio of 1:2 dry and green feeding was maximum in case of medium farmers (23.33%). Traditional system of animal rearing along with grazing on fallow/harvested fields and sani with wheat bhusa/chaffed paddy straw along with locally available concentrates/wheat flours prior to milking was the most common feeding practice in the study are. The findings are contrary to R.K. Singh *et al.*, (2013).

Common salt and mineral mixture feeding was very limited to the dairy animals. salt was offered by only 46.0 percent, whereas mineral mixture feeding was practiced occasionally by 33.35 percent respondents. Majority (54.0%) of farmers fed salt through feed, followed by water (42.0%) and through chapatti (4.0%). The findings are contrary to results of Dhiman (1980), Panwar (1992), Kumar and Mishra (2011).

Regarding practice of feeding roughages and concentrate to dairy animals twice a day was common within 74 and 68 percent of the respondents, respectively. Majority (46.5%) of them practiced roughage feeding early in morning and in night, whereas only 27 percent fed in morning, afternoon and in night. Nutritious green fodder feeding throughout the year was practiced by only 25 percent respondents rest fed it seasonally. The findings are in consonance to findings of Dhiman (1988), Panwar (1992) and Swaroop *et al.*, (2014).

Data regarding grazing practices revealed that majority (81.50%) of them followed regular grazing which is in line to findings of Rangamma *et al.* (2013) and Swaroop *et al.* (2014). Due to lack of grazing land 58 percent respondents practiced grazing of animals on post harvest fields and 19 percent on road sides, the findings are in line with Swaroop *et al.* (2014) and contrary to results of earlier researchers which may be ascribed to difference in the study area.

CONCLUSION

On the basis of finding of the present investigation, it may be concluded that existing feeding practices were not very satisfactory in the study area and needs improvement. Rice–wheat being the predominant cropping system in the area, none of the farmers fed single fodder. Traditional system of livestock rearing with grazing on fallow/harvested fields along with sani with locally available roughage and concentrate/ wheat flours prior to milking was the most common feeding practice. The respondents lack in knowledge of scientific livestock feeding, milch animals should be fed adequate quality of green fodder and concentrate to obtain their potential yield Thus there is a tremendous scope of scientific feeding and management with available feed and fodder resources for optimum and economical production.

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CHANGING PATTERN OF FISH LANDINGS AND FISH SPECIES COMPOSITION IN THE GANGA RIVER SYSTEM

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ABSTRACT

The River Ganga and Yamuna are main capture Fishery resources in Allahabad region. Fish landings in Allahabad region were observed during January 1998 to Dec. 1998. Average annual landing was recorded 199.3 tonnes. Indigenous major carps rohu, bhakur, mrigal contributed 5.2, 6.2 and 3.5 tonnes respectively. Among the major Carps the catch was dominated by Calbasu and average annual landing was recorded 29.6 tonnes. Trash fish also dominated the catch. If it is compared with present situation, the catch of Indian major Carps have become negligible. Catch is dominated by exotic fishes and certain cat fishes. Hilsa is not seen in the riverine catches.

Keywords : Major Carps, catfish, exotic fishes, fisheries.

Statistical records of fish catch composition is helpful in understanding the trends in fisheries and effective management for sustained production of fish.

Data on fish landings can be used to assess the present position of fish stocks and for the prediction of trends. The changing trend in the riverine fish species composition is indicative of alteration of environment, fishing activities, pollution and other natural and anthorpogenic influences.

The Ganga River system is one of the most important river systems and has a catchment area of 9.71 lakh km^2 (Job, 1951). Various attempts have been made to study the fishery productivity and population dynamics in this river system by a number of scientists; Jhingran 1970; Afser, 1992; Gupta and Tyagi, 1992; Singh et. al. 1996).

MATERIALS AND METHODS

A study of riverine fisheries and fish catch composition was made during 1998 from the rivers Ganga and Yamuna at Allahabad. Fish collecting centres (Teliarganj, Daraganj Gaughat Sadiapur) were visited every week and on-the-spot study of fish catch was made to find our species-wise percentage contribution of fish. On the basis of total landings of fish at the four fish collecting centres an estimate was also made of per day total catch of fish which was computed to give an estimate of per month and annual catch of the fish.

RESULTS AND DISCUSSION

The study of fish landings at Allahabad during Jan. 1998 to Dec. 1998 showed an average landings of 199.3 t per year. Labeo calbasu has emerged as the most dominant fish among the carps (average annual landings 29.6 t). Average annual landings of Labeo rohita, catla catla and cirrhinus mrigala were recorded 5.2 6.2 and 3.5 t respectively. Larger catfish (Aorichthys seenghala A. aor, Wallago attu and Rita rita) made the highest contribution to the

fishery (average annual landings 114.1 t) with a percent contribution of 57.2. The two species of Aorichthys (A. aor and A. seenghala) dominated the catch with a percentage contribution of 42.3. The Schilbeid species Clupisoma garua was abundant in the catch by number but due to its lean body constituted only 9.5% of the total catch.

Miscellaneous fishes were represented by Labeo bata, Setipinna phasa, Ailia coila, Cirrhinus reba, Gadusia chapra, Gonialosa manmina, Notopterus chitala, N. notopterus Mastacembelus armatus, M. pancalus, Oxygaster bacaila, Pangasius pangasius, Silonia silondia, Aorichthys cavasius, A. vittatus, Sciana coitor, Punitus sarana, P. sophore, Osteobrama cotio Gagata cenia, Aspidopara morar, Anabas testudineus, Nandus nandus, Colisa fasciata, Rhinomugil carsula, Channa punctatus, Glossogobius giuris, Chagunius chagunio Hilsa ilisha. Chanda nama, Xenentodon cancila, Ompok bimaculatus and Tetradon cutcutia. Miscellaneous fishes formed an important part of the fishery. Their average annual landings were observed 18.0 tonnes.

Comparative statement of average annual landings

Species	1958-59 to 1965-66 *Jhingran etl.al.1970*		1973 to 1986 Gupta and Tyagi, 1992		Jan 1998 to Dec. 1998	
	Av. (t)	%	Av. (t)	%	Av. (t)	%
L. rohita	16.67	8.5	2.87	2.1	5.2	2.6
C. catla	16.86	8.6	4.26	3.1	6.2	3.1
C. mrigala	36.01	18.4	9.40	6.8	3.5	1.8
L. calbasu	9.57	4.9	23.82	17.1	29.6	14.9
A. aor and A. seenghalat	34.28	17.5	23.36	16.8	84.4	42.3
W. attu	12.54	6.4	4.98	3.6	9.2	4.6
H. ilisha	20.16	10.3	NG	-	neg	-
Others	49.65	25.4	70.21	50.5	61.2	30.7
Total	**195.74**		**138.9**		**199.3**	

Av. (t) = Average annual landings (tonnes)
neg = Negligible
NG = value not given

River are important inland fishery resource. Increased fishing pressure in the rivers coupled with water pollution and anthropogenic activities has adversely affected the fish population. The effect of environmental changes cause increased rate of erosion and silt loads in rivers causing depletion of dissolved oxygen and fish food organisms (Dudgeon, 1994) Considerable fluctuations in DO values, pH and conductivity were attributed to several factors such as flooding, increased organic load from sewers and nallas and anthropogenic influences (Singh et. al., 1996; Nautiyal et. al. 1997).

Fisheries abundance and distribution are largely controlled by physico-chemical environmental variables and other factors, including fish food organisms (Ricker 1975; Welcome, 1985) Impact of environmental degration on fisheries of the river Ganga have been studied by a number of workers including Jhingran (1989), Bilgrami et. al. (1992). Maturation and spawning of Indian carps are affected by a number of environmental factors like flooded conditions of river monsoon cycle, high turbidity and slightly low temperature of flooded river.

Jhingran 1970 observed the capture fishery of river Ganga at Buxar (Bihar, India) and recorded C. mrigala (mrigal) as the most dominant and L. calbasu contributed only 4.3% of total major carp fishery. M. aor was found to be most dominant among catfishes and Clupisoma garua contributed to a lesser extent (0-0.8% during 1952 and 1954). He recorded the hilsa as the most dominant fishery and next in order of importance were catfishes followed by carps. Kumar (1996) studied the fishery of river Ganga around Patna and found that C. catla dominated the major carp fishery and catch of L. calbasu was recorded minimum. Hilsa landings showed a drastic decline.

Jhingran et. al. (1970) recorded the mrigal as the most dominat (18.4%), L. calbasu contributing only 4.9% to the total fishery. Gupta and Tyagi (1992) reported the dominance of major carp fishery (28.9%) followed by major catfishes (20.3%) in Allahabad region. L. calbasu occupies a prominent position in the catch and has emerged as principal component of major carp fishery in Allahabad region (Tyagi et. al., 1994.)

Analysis of fish catch composition indicated that calbasu contributed 14.9% to the total fishery with an average annual landing of 29.6 t. During recent years the catch of other three major carps (L.rohita C. catla and C. mrigala) has declined. Hilsa landings at Allahabad are negligible and W. attu showed a declining trend. Larger catfishes (Aorichithys and Rita) and Clupisoma garua and the fishery of miscellaneous species, including trash fishes dominated the catch.

Thus during the period of observation in 1998 there was no contribution of exotic fishes like common carp, tilapia etc. even a single specimen was not recorded and if this is compared with present situation it is clear that the exotic fishes like common carp, tilapia etc. have not only entered the riverine system but have become well established and catch of Indian major carps have become negligible and presently riverine fisheries is dominated by exotic fishes and certain cat fishes and trash fishes.

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