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INTEGRATED MANAGEMENT OF COLLAR ROT DISEASE CAUSED BY *SCLEROTIUM ROLFSII* ON LENTIL CROPS THROUGH BIOLOGICAL AND CHEMICAL TREATMENTS

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ABSTRACT

***Clay soil (CS) based bioformulation of Trichoderma harzianum* (Indian Type Culture Collection No. 6797), *T. viride* (ITCC No. 2109), and *T. virens* (ITCC No. 4177) were developed and tested for their ability to infect, macerate and kill the sclerotia of *Sclerotium rolfsii* Sacco alone and in integration with Bavistin @2.5g/kg, Metalaxyl + Mancozeb @1.5g/kg, Thiram @2.5g/kg on lentil crop under sick plot. Out of all tested combination of *Trichoderma* spp. along with above fungicides, clay soil based *T. virens* + Metalaxyl + Mancozeb was found most significantly effective to manage the collar rot disease caused by *S. rolfsii* on lentil crop.**

Key words : Bioformulations, biocontrol agents, collar rot disease*, Sclerotium rolfsii*, fungicides and lentil, rainfed

Collar rot disease caused by *Sclerotium rolfsii* on lentil crops is very important polyphagus pathogenic fungi prevalent in rainfed region of Bundelkhandkhand and causes substantial losses in quality and productivity of yield. *S. rolfsii* Sacco is a non-specialized soil borne fungal pathogen of worldwide importance and has a host range of over 500 species (Punja, 1988). To avoid the above yield loss, a good number of fungicide has been utilized by farmers but due to the indiscriminate use of fungicides recommended for the management of collar rot disease started to cause hazardous impact on environment, ecology of beneficial microbes and human while poor seed replacement rate and continues mono cropping are also helping greatly to establish the population of *S. rolfsii* in soil of farmer's field. As alternative of above, the use of antagonistic fungal/bacterial biocontrol agents showed the promising results to existing hazardous chemical practices for sustainable cultivation. Successful biocontrol depends largely on the use of appropriate formulation and delivery system of efficacious bioagents. Formulation is necessary to retain the viability during preparation, storage and ease of application and favour survival of bioagent in the environment. Successful biocontrol of *S. rolfsii* by infesting fields with cultures of *Trichoderma* spp. has been reported (Elad *et al.,* 1980; Sreenivasaprasad and Manibhushanrao, 1993). *Trichoderma* species are known to attack the sclerotia of *S. rolfsii,* and render them non-viable (Henis *et al.,* 1983; Kohl and Schlosser, 1988, 1989; Manzali *el al.,* 1993). Through the scanning of literature a good number of reports are found on the process of sclerotial parasitization, sclerotial penetration and variability among isolates of *Trichoderma* for

their pathogenicity against *S. rolfsii* (Samuels, 1996; Desai and Schlosser, 1999) which makes it rather easier to understand the basic phenomenon of biological control. Hence, this study is attempted, by taking a step ahead to test different formulation of *Trichoderma harizanum, T. virens, and T. viride* alone and in combination of different fungicides to generate the information on integrated management of the collar rot disease caused by *S. rolfsii* and sclerotial parasitization by different species of Trichodemra on sick plot.

MATERIALS AND METHODS

Development of bio-formulation

Formulations of *T. harzianum* (Indian Type Culture Collection No. 6797), *T. viride* (ITCC No. 2109), and *T. virens* (ITCC No. 4177), from culture collections of Biocontrol Laboratory, Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi were selected for the present investigations. The fungal antagonists were maintained on PDA slants at 5°C after growing for seven days at 28± 1°C separately. *T. harzianum*, *T. viride*, and *T. virens*, were multiplied on preboiled sterilized sorghum grains having 5 percent anhydrous dextrose conical flasks separately. The inoculated sorghum grains were incubated at 28±1°C for 15 days. Colonized grains with *T. harzianum*, *T. viride*, and *T. virens* were air dried, powdered and sieved with 80 mesh sieve separately. The concentration of conidia and chlamydospores was determined using a haemcytometer prior to preparations of each 3 species of Trichoderma. The fine powder of *T. harzianum*, *T. viride*, and *T. virens* were properly mixed with adjuvant clay soil (CS) @ $1x10^{10}$ by maintaining 5% carboxymethyl cellulose (CMC) w/w. These preparations were stored at 5°C for further studies.

Efficacy and compatibility of formulations: Pot trials

The experiments were conducted under net house conditions (temperature 25-28°C, relative humidity 60-70 percent, soil moisture 66-70 percent) in 8" plastic pots filled with sterilized sandy loam soil. Each pot was inoculated with inoculum from one week old culture of *S. rolfsii,* @ 2.5g grown on sorghum grains. The lentil (variety - DPL 62 Sheri procured from IIPR Kanpur) seeds treated alone with *T. harzianum* + CS + CMC, *T. viride* + CS + CMC, *T. virens* + CS + CMC (@ 6g/kg seed), Bavistin @2.5g/kg, Metalaxyl + Mancozeb @1.5g/kg, Thiram @2.5g/kg, while in combination with *T. harzianum* + CS + CMC + Bavistin @2.5g/kg, *T. harzianum* + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg, *T. harzianum* + CS + CMC + Thiram @2.5g/kg, *T. viride* + CS + CMC + Bavistin @2.5g/kg, *T. viride* + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg, *T. viride* + CS + CMC + Thiram @2.5g/kg, *T. virens* + CS + CMC + Bavistin @2.5g/kg, *T. virens* + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg and *T. virens* + CS + CMC + Thiram @2.5g/kg were sown after one week in pathogen infested pots along with maintaining adequate check without any treatment was used for comparison.

Ten seeds were sown in each pot having eight replications. Data on seedling emergence were recorded 10 days after sowing (DAS) and final plant stand was counted 60 DAS. The amount of powdered preparations of *T. harzianum*, *T. viride*, and *T. virens* were adjusted in such a way to mix in clay soil (adjuvant) that all the treatments had reach equal spore load, i.e., $1x10^{10}$ colony form unit (CFU)/kg seed.

Field trials

Similarly, a field trial was conducted

7	Water management	4 -5 irrigation	100(83.33)	20(16.67)	0(0)	140***
8	Interculture	Pendimethaline @ 3.3 lit/ha as pre emergence Earthing after top dressing of nitrogen up to height of 10 -15 cm	0(0) 0(0)	0(0) 0(0)	120(100) 120(100)	240*** 240***
9	Plant protection measures (I) Termite control (II) Green fodder	Application of chloropyriphos @ 3 -4 lit/ha with irrigation Dusting with endosulphan 4% @25 kg/ha	0(0) 0(0)	0(0) 0(0)	120(100) 120(100)	240*** 240***
10	Harvesting	At appropriate stage	100(83.33)	20(16.67)	0(0)	140***
11	Yield	20 - 25 q/ha	20(16.67)	100(83.33)	0(0)	140***
12	Post harvest management	Dry the kernels up to 8-10 % moisture	10(8.33)	110(91.67)	0(0)	185***

Figures in parenthesis are percentage *** Significant at 0.1 per cent level of significance

adoption was also found in case of chemical control of green hopper and termite, interculture operations and use of FYM/compost. Singh (2000) Observed that diverse farming situations are existing in different agro – ecological situations in district Kanpur Nagar indicating more number of small and marginal landholder.

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10	Harvesting	Leaves yellowishing stage of cob	100(83.33)	20(16.67)	0(0)	140***
11	Yield	40-45 q/ha for hybrid 30-35 q/ha	20(16.67) 10(8.33)	100(83.33) 110(91.67)	0(0) 0(0)	140*** 185***
12	Post harvest management	Sundrying of cob for graining	110(91.67)	10(8.33)	0(0)	185***

Figures in parenthesis are percentage *** Significant at 0.1 per cent level of significance

Table -5. Level of adoption of improved technologies in Zaid -Sunflower N = 120

S.No.	Particulars	Recommended level	Level of adoption			X^2
			F. A.	P. A.	N.A.	
1.	Sowing time	II week of february	20.0(16.67)	90(75)	10(8.33)	95 ***
2.	Varities	Modern, Hybrid	20(16.67)	100(83.33)	0.0(0)	140***
3.	Seed rate	12 - 15 kg/ ha	110(91.67)	10(8.33)	0(0)	185***
4	Seed Treatment	Water treatment followed by thirum @3 g/kg	0(0)	0(0)	120(100)	240***
5	Manure and fertilizers FYM/Compost NPK Gypsum	 30 -40 q/ha 80:60:40 kg/ha 200 kg/ha	 0(0) 20(16.67) 0(0)	 20(16.67) 100(83.33) 0(0)	 100(83.33) 0(0) 120(100)	 140*** 140*** 240***
6	Method of manure and fertilizer application FYM NPK	 Basal application Half N , full P & K at sowing and remaining half N after 25 -30 days of sowing	 0(0) 0(0)	 20(16.67) 100(83.33)	 100(83.33) 20(16.67)	 140*** 140***

during 2012-2013 and 2013-2014 in sick plot with collar rot causing *S. rolfsii* pathogen at field of University farm, Jhansi, U.P, The trial was laid out in a Randomized Block Design with six replications. The individual plot size was *3mx2.5m.* Fertilizer 20-17–16–20 kg NPKS/ha were applied before furrow opening. Seeds treated with various formulations and fungicides alone and in combination as designed for pot trials were sown in the field @ 110 kg/ha. Germination was counted after 15 DAS. The diseased seedlings were recorded periodically after one month while final plant stand observed at maturity. Yield data per plot was recorded by harvesting the entire rows of each plot.

RESULTS AND DISCUSSION

Results on the efficacy of the formulations of 3 *Trichoderma* species and fungicides alone and in-combination on collar rot causing disease *S. rolfsii* on lentil in pot trials under net house experiment showed that all the treatment significantly improved seed germination over check (Table 1). Minimum seedling mortality was observed with all remaining combined seed treatment with formulations and fungicides (18.1% - 25.9%) as compared to seed treatment given alone with *T. harzianum* + CS + CMC, *T. viride* + CS + CMC, *T. virens* + CS + CMC, Bavistin, Metalaxyl + Mancozeb, Thiram. A seed treatment of *T. virens* + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg resulted maximum seed germination, minimum disease incidence with highest pod yield during both years followed by rest all other seed treatment with alone and combined. Seeds treated with bioformulation of Trichoderma spp., *T. virens* alone showed superiority over fungicides alone in all respects. Of the fungicides alone seed treated, Metalaxyl + Mancozeb @1.5g/kg treated seeds showed superiority over others fungicide alone treated in all respects. Therefore, the integration of *T. harzianum*, *T. viride, T. virens* and fungicide were more effective in controlling the disease incidence and increasing the seed germination and yield. This may be due to longer and more effective protection provided by these treatments to the germinating seeds and also may be due to synergistic effect. A similar effect has been observed by earlier workers due to integration of bioagents with fungicides in different crop plants. The effectiveness of *T. viride* for the management of this disease is supported by other workers (Singh *et. al.* 2012, Nagamani *et. al*. 2013, and Hoque *et. al.* 2014). A similar observation on the use of carboxymethyl cellulose for efficient use of biocontrol agent has been made by Harman *et al.* (1980) wherein he reported proliferation of biocontrol agent on seed coat.

Results of field trials showed that all the seed treatment given by bioformulation of *Trichoderma* species in combination with fungicides, significantly improved seedling emergence, plant stand and grain yield of lentil than alone seed treated with bioformulation of *Trichoderma* species in combination with fungicides (Table 2). The highest significant seedling emergence, plant stand and grain yield was obtained in combined seed treatment given by *T. virens* + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg (Table-2). Biological control of collar rot of lentil caused by *S. rolfsii* has been achieved by seed and soil treatment with the *Trichoderma* and *Gliocladium* by Mukhopadhyay (1995), Desai and Schlosser (1999), Singh *et al.* (2012), Nagamani *et al*. (2013), and Hoque *et. al* (2014). But the success of a biocontrol agent depend on its ability to produce inoculum in excess and to survive,

Table 1: Effect of seed treatment with antagonists and fungicides on seed germination and seedling mortality of Lentil (Cv.-DPL-62 Sheri) incited by collar rot disease causing *Sclerotium rolfsii in pot trial*

Treatment	Seed germination (%)	Increase in germination over check (%)	Seedling mortality (%)	Disease control over check (%)
T. harzianum + CS + CMC	66.7 (54.76)	27.14	10.5 (18.91)	32.5
T. viride + CS + CMC	62.7 (52.37)	23.14	9.8 (18.24)	33.2
T. virens + CS + CMC	69.0 (50.9)	29.44	8.5 (16.95)	34.5
Bavistin @2.5g/kg	43.3 (56.17)	3.74	19.8 (26.42)	23.2
Metalaxyl + Mancozeb @1.5g/kg	72.0 (58.05)	32.44	6.8 (15.12)	36.2
Thiram @2.5g/kg g/kg	46.5 (42.99)	6.94	22.5 (28.32)	20.5
T. harzianum + CS + CMC + Bavistin @2.5g/kg	69.5 (56.48)	29.94	9.6 (18.05)	33.4
T. harzianum + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	76.8 (61.21)	39.24	4.9 (12.78)	38.1
T. harzianum + CS + CMC + Thiram @2.5g/kg g/kg	68.0 (55.55)	28.44	9.2 (17.65)	33.8
T. viride + CS + CMC + Bavistin @2.5g/kg	68.5 (55.86)	28.94	8.2 (16.64)	34.8
T. viride + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	74.6 (59.74)	35.04	3.8 (11.24)	39.2
T. viride + CS + CMC + Thiram @2.5g/kg g/kg	66.4 (54.57)	26.84	8.0 (16.43)	35.0
T. virens + CS + CMC + Bavistin @2.5g/kg	73.9 (59.28)	34.34	7.4 (15.79)	35.6
T. virens + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	86.5 (68.44)	46.94	1.9 (7.92)	41.1
T. virens + CS + CMC + Thiram @2.5g/kg g/kg	72.25 (58.21)	32.69	8.1 (16.53)	34.9
Control	39.56 (38.97)		43.0 (40.98)	
S. Em±	(0.82)		(0.31)	
LSD (P= 0.05)	(2.59)		(1.85)	
Mean of Eight replicates; Figures in parentheses are angular transformed values; CS = clay soil; CMC = Carboxymethyl cellulose				

grow and proliferate well on seed coat, spermosphere and rhizosphere of the growing plants. Such types of antagonistic establishment need a substrate during seed treatment which can provide a better coating on seed surface and food base to antagonist for better proliferation. *Gliocladium virens* forms appressorium-like structures on the host fungus and achieves its infection by active penetration. *G. virens* parasitize sclerotia internally which are incapable of either myceliogenic or ascocarpic germination (Tu, 1980). It is active over a broad range of soil moisture levels and over the entire agricultural soil pH range (pH 5–8). Although active parasitism takes place in soil over the range of 15–35°C, but parasitism at 15°C is greatly reduced compared with that at higher temperature (Phillips, 1986a). Jones *et al*. (1974) reported that β-(1–3)-glucanase and chitinase are the key enzymes involved in the destruction of cell walls of *S. sclerotiorum* by *C. minitans* and *Trichoderma viride*. Ghaffar

Table -4. Level of adoption of improved technologies in wheat **N = 120**

S.No.	Particulars	Recommended level	Level of adoption			X^2
			F. A.	P. A.	N.A.	
1.	Sowing time	I fortnight of November	40.0(33.33	60(50)	20(16.67)	20***
2.	Varities	UP 2003, K 68, HD 2329, K 9106, Malviya 534, Halna, PBW 343	100(83.33)	20(16.67)	0.0(0)	140***
3.	Seed rate	100 -120 kg/ ha	20(16.67)	90(75)	10(8.33)	95***
4	Seed Treatment	Thirum @2.5g/kg	20(16.67)	80(66.66)	20(16.67)	60***
5	Manure and fertilizers FYM/Compost NPK Zinc	 100 -120 q/ha 120:60:40 kg/ha for dwarf wheat 90:30:30 kg/ha for improved wheat	 20(16.67) 10(8.33) 10(8.33)	 100(83.33) 90(75.0) 100(83.33)	 0(0) 20(16.67) 10(8.33)	 100*** 95*** 135***
6	Method of manure and fertilizer application (I) Basal NPK,Zinc (II) Top dressing I (III)Top dressing II	 30;30:30kg/ha at last ploughing 15 kg N/ha after 23-30 days of planting 15 kg N/h a afer 50-60 days of planting	 30(25) 20(16.67) 10(8.33)	 90(75) 100(83.33) 100(83.33)	 0(0) 0(0) 10(8.33)	 105*** 140*** 135***
7	Inter-culture	2	100(83.33)	20(16.67)	0(0)	140***
8	Plant protection measures (I)Soil treatment (II) Insect control (III) Disease control	 Chloropyriphos 20 EC @ 2.5 liter/ha Furadan 6% @20 kg/ha Indofil M-45 @ 2.5 kg/ha	 0(0) 0(0) 0(0)	 0(0) 20(16.67) 0(0)	 120(100) 100(83.33) 120(100)	 240*** 140*** 240***
9	Irrigation	(I) Management of moisture at silking stage (II) As and when required	120(100) 100(83.33)	0(0) 20(16.67)	0(0) 0(0)	240*** 140***

7	Inter-culture	2	100(83.33)	20(16.67)	0(0)	140***
8	Plant protection measures (I)Soil treatment (II) Insect control (III) Disease control	 Chloropyriphos 20 EC @ 2.5 liter/ha Furadan 6% @20 kg/ha Indofil M-45 @ 2.5 kg/ha	 0(0) 0(0) 0(0)	 0(0) 20(16.67) 0(0)	 120(100) 100(83.33) 120(100)	 240*** 140*** 240***
9	Irrigation	(I) Management of moisture at silking stage (II) As and when required	120(100) 100(83.33)	0(0) 20(16.67)	0(0) 0(0)	240*** 140***
10	Harvesting	Leaves yellowishing stage of cob	100(83.33)	20(16.67)	0(0)	140***
11	Yield	40-45 q/ha for hybrid 30-35 q/ha	20(16.67) 10(8.33)	100(83.33) 110(91.67)	0(0) 0(0)	140*** 185***
12	Post harvest management	Sundrying of cob for graining	110(91.67)	10(8.33)	0(0)	185***

Figures in parenthesis are percentage *** Significant at 0.1 per cent level of significance

sowing time were partially adopted by the majority of the farmers. Adoption of the practices of spraying of malathion in godown and spray of chemicals to control blight and rust were not observed et al. The values of X^2 reflect that there is significant adoption of most of the practices recommended for cultivation of wheat crop. Spray of chemicals to control diseases and stored grain pests represent non signicant adoption. Sonkar (2002), found that non - availabilty of quality seeds and planting materials, inadequate knowledge, infestation of disease and pests and unorganized market were major problems associated with cereals, pulses, oilseeds and vegetables.

5. Level of adoption of improved technologies in Zaid -Sunflower

Table- 5 contemplates that proper seed rate, water management, harvesting at suitable stage of maturity were found highly full adoption of 9.67 and 83.33 per cent respectively. Post harvest management, yield of hybrid cultivar, method and dose of N:P:K in standing crop and improved varieties, and sowing time were partially adopted. The practices of chemical control of green hopper and termite, interculture operations and use of FYM were not being adopted et al. Values of X^2 reveal that most of the practices recommended for zaid sunflower are adopted significantly. Significant non

(1972) speculated that melanolytic enzymes played a role in permitting entry though the sclerotial rind. Purified glucanases have been separated and shown to degrade 'sclerotan' a major cell wall component of the sclerotia (Bacon *et al*., 1972; Jones *et al*., 1974). When sclerotia are placed in soils infested with *T. viride*, it is found that sclerotia that had been grazed by larvae are more susceptible to colonization by *T. viride* than undamaged sclerotia (Anas and Reeleder, 1988b). The production of β-1, 3 glucanases and chitinases enable the mycoparasite to utilize the host cells and mycelium of the mycoparasite proliferates around dead hyphae of the host fungus. *Trichoderma* spp., such as *Trichoderma koningii*, *T. harzianum* and *T. viride*, also has been used to reduce the number of viable sclerotia in soil. These are an important group of fungi with biological control potential and are being examined in numerous patho-systems for efficacy. In soil infested with one isolate of *T.*

Table 2: Effect of seed treatment with antagonists and fungicides on seed emergence, plant stand final and yield of Lentil (Cv.-DPL-62 Sheri) incited by collar rot disease causing *Sclerotium rolfsii in field trial*

Treatment	Seedling emergence (%)	Increase emergence (%)	Plant stands final (%)	Increase in plant stand (%)	Yield (q/ha)	Increase in yield (%)
T. harzianum + CS + CMC	78.52 (62.39)	26.12	92.40 (74.0)	13.87	13.45	11.34
T. viride + CS + CMC	79.45 (63.04)	27.05	91.58 (73.13)	13.05	13.38	9.72
T. virens + CS + CMC	80.74 (63.97)	28.34	94.75 (76.75)	16.22	13.52	10.65
Bavistin @2.5g/kg	74.23 (59.49)	21.83	89.50 (71.09)	10.97	13.37	9.65
Metalaxyl + Mancozeb @1.5g/kg	83.95 (66.38)	31.55	93.70 (75.46)	15.17	13.50	10.52
Thiram @2.5g/kg g/kg	77.90 (61.96)	25.50	88.35 (70.04)	15.17	13.38	10.76
T. harzianum + CS + CMC + Bavistin @2.5g/kg	80.35 (63.69)	27.95	93.78 (75.56)	15.25	14.72	21.85
T. harzianum + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	85.91 (67.95)	33.51	95.20 (77.34)	16.67	14.77	22.27
T. harzianum + CS + CMC + Thiram @2.5g/kg g/kg	80.40 (63.72)	28.0	91.50 (73.05)	12.97	14.70	21.69
T. viride + CS + CMC + Bavistin @2.5g/kg	81.25 (64.34)	28.85	92.50 (74.11)	13.97	14.72	21.85
T. viride + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	86.25 (68.23)	33.85	94.50 (76.44)	15.97	14.76	22.19
T. viride + CS + CMC + Thiram @2.5g/kg g/kg	82.30 (65.12)	29.90	91.40 (72.95)	12.87	14.73	21.94
T. virens + CS + CMC + Bavistin @2.5g/kg	82.80 (65.50)	30.40	93.80 (75.58)	15.27	14.89	23.26
T. virens + CS + CMC + Metalaxyl + Mancozeb @1.5g/kg	88.79 (70.44)	36.39	96.85 (79.78)	18.32	14.93	23.59
T. virens + CS + CMC + Thiram @2.5g/kg g/kg	83.40 (65.96)	31.0	92.50 (74.10)	13.97	14.88	23.18
Control	52.40 (65.20)		78.53 (62.40)		12.08	
S. Em±	(0.69)		(0.98)		(0.27)	
LSD (P= 0.05)	(1.34)		(1.85)		(0.11)	

Mean of six replicates; Figures in parentheses are angular transformed values; CS = clay soil; CMC = Carboxymethyl cellulose

koningii @ 10^8conidia/g, 100 per cent of the sclerotia of *S. sclerotiorum* are parasitized and killed within 60 days under field conditions (Dos Santos and Dhingra, 1982), although selected isolates of the same species varies in their efficacy. *T. harzianum* parasitizes mycelium and sclerotia of *S. sclerotiorum* and destroys sclerotia within 15 days (Singh, 1991b). *T. roseum* reduces the viability of sclerotia by upto 54 per cent after 15 days of incubation in soil. None of the sclerotia can germinate after 30 days of incubation, even though this fungus does not appear to parasitize *S. sclerotiorum*. Desai and Schlosser (1999) observed through the SEM studies indicate the nature of parasitism of forty four isolates of *Trichoderma* spp. on sclerotia of *S. rolfsii* wherein the sclerotia are first penetrated by the biocontrol agent followed by colonization and fmally killing the sclerotia. The other ways of sclerotial parasitism such as enzymatic digestion of sclerotium without penetrating the sclerotium could be ruled out from the present study (Epps 1951, Elad *et. al* 1983, Papavizas, 1985). However, for confirmation of is hypothesis, such Scanning Electron Microscope studies has to be done using many isolates. In the present investigations promising results were obtained to manage the collar rot disease of lentil caused by *S. rolfsii* with different combination of bioformulations along with fungicides (Kaur and Mukhopadhyay 1992). Application of *G. virens based bioformulations along with* different compatible fungicides into soil through seed treatment should be particularly exploited especially against soil-borne plant pathogens such as *S. rolfsii* that could be an effective and useful approach as it provides better coating and food base on seed surface for better proliferation of biocontrol agents.

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and basal dose of N:P:K chemicals for disease control, soil treatment for controlling termites, control of insects, use of FYM/ compost and seed treatment with thirum were not adopted by the farmers. Values of X^2 reveal that there is significant adoption of the major practices of maize. Srivastava and Yadav (1999) Found that by adoption of technology in the farming system " fodder production - dairy – poultry" , the farmer could earn 90 per cent profit as compared to the normal practice of utilization of berseem as green fodder by cattle.

4. Level of adoption of improved technologies in wheat : It is clear from table- 4 that adoption of the practices of appropriate harvesting and optimum yield was highest as 91.67 per cent farmers were fully adopted it. The practices of water management, suitable doses of fertilizers after first irrigation at tillering stage and showing of suitable improved varieties were found to be fully adopted by 83.33 per cent of farmers, whereas, storage of grains after drying, proper doses of fertilizers at sowing for improved wheat and dwarf wheat were found to be fully adopted by 83.33 per cent of farmers . Storage of grains after drying , proper doses of fertilizers at sowing for improved wheat and dwarf wheat were found to be fully adopted by 75 per cent respondents. The adoption of other important practices viz. use of alluminium phosphide in storage, fertilizer application after first irrigation, use of FYM and proper N:P:K as basal application for dwarf and improved wheat, seed treatment with thirum and proper

Table -3. Level of adoption of improved technologies in maize

S.No.	Particulars	Recommended level	Level of adoption			X^2
			F. A.	P. A.	N.A.	
1.	Sowing time	Mid – End June	20.0(16.67	100.0(83.33)	0.0(0)	140 ***
2.	Varities	Kanchan,Azad Uttam,Mahi Kanchan, Navjyoti,Pro-agro-4212	90.0(75.0)	30.0(25.0)	0.0(0)	105***
3.	Seed rate	20kg/ ha	30.0(25)	90.0(75)	0(0)	105***
4	Seed Treatment	Thirum @2.5g/kg	0(0)	0(0)	120(100)	240***
5	Manure and fertilizers					
	FYM/Compost	100 -150 q/ha	0(0)	0(0)	120(100)	240***
	NPK	60:30:30 kg/ha	20(16.67)	100(83.33)	0(0)	140***
	Zinc	20 kg/ha	10(8.33)	110(91.67)	0(0)	185***
6	Method of manure and fertilizer application					
	(I) Basal NPK,Zinc	30;30:30kg/ha at last ploughing	30(25)	90(75)	0(0)	105***
	(II) Top dressing I	15 kg N/ha after 23-30 days of planting	20(16.67)	100(83.33)	0(0)	140***
	(III)Top dressing II	15 kg N/h a afer 50-60 days of planting	10(8.33)	100(83.33)	10(8.33)	135***

membership of one organization (50 per cent) followed by the respondents having no membership of any organization.

2.Distribution of farmers according to cropping systems adopted :

Table- 2 shows that majority (65 per cent) of the farmers adopted the cropping system of maize – potato – wheat followed by maize – potato – sunflower (58.33 per cent) , paddy –wheat - urd/moong (43.33 per cent), maize – mustard/pea (29.17 per cent) and jowar – berseem (14.17) cropping systems. Singh (2000) Observed that diverse farming situations are existing in different agro – ecological situations in district Kanpur Nagar indicating more number of small and marginal landholders.

3. Level of adoption of improved technologies in maize: Table -3 reveals that management of moisture at silking stage, post harvest management, harvesting at suitable stage and irrigation as and when required, interculture operations and showing of seeds of improved varieties were highly adopted practices with the level of full adoption of 100.0,91.67,83.33, 83.33, 83.33 and 75.0 percent of respondents, respectively. Yield of composite maize and use of proper dose of zinc sulphate (91.67 per cent), yield of hybrid maize, method of application of N for top dressing I and II and proper sowing time were found partially adopted with the levels of 83.33 per cent. Use of proper seed rate

Table -1.Distribution of respondents on the basis of social participation

S.No.	Social participation	Respondents	
		Number	Percentage
1.	No membership of any organization	38.0	31.67
2.	Member of one organization	60.0	50.00
3	Member of more than one organization	12.0	10.00
4.	Office bearers	10.0	08.33
	Total	120.0	100.00

Table -2. Distribution of farmers according to cropping systems adopted

S. no.	Crop rotation	No. of farmers	Percentage
1.	Maize –potato -wheat	78.0	65.00
2.	Maize – potato - sunflower	70.0	58.33
3.	Paddy – Wheat – Urd/Moong	52.0	43.33
4.	Maize –Potato – Urd/Moong	49.0	40.83
5.	Maize – Mustard - Pea	35.0	29.17
6.	Jowar - Berseem	17.0	14.17

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PEOPLE PARTICIPATION AND LEVEL OF ADOPTION OF IMPROVED TECHNOLOGIES OF CROPPING SYSTEMS IN DISTRICT FARRUKHABAD ,U.P.

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ABSTRACT

The study was conducted for the purpose of analysis of role of recommended cropping systems for the area and the level of their adoption by the farming community. Major cropping systems of the area are Maize –Potato – Sunflower and Paddy – wheat – Urd/moong. most of the recommended practices for cereals were adopted by the farmers. Application of manures and seed treatment before sowing of seed were not in regular practice. Proper doses and proportion of NPK were partially adopted practices by the farmers of the area.

Key Words: *Adoption, participation, respondents, post-harvest management*

The farming system approach has emerged as a major theme for agricultural research and rural development in recent years . The understanding of existing farming system is an essential pre- requisite for formulating sensible innovations for achieving agricultural development as stated by Veelekar in India in 1899. In fact the “Farming System Research” began to be applied in mid 1990's to technological development activities specially for small and limited resource farmers. Farming system is a complex interrelated matrix of soil, water, plant, animals, implements, power, labour capital and other inputs controlled in parts by farming families and influenced by varying degrees by capital economic, institutional, and social forces that operate at many levels.

MATERIALS AND METHODS

The present study was conducted in central Uttar Pradesh . It is one of the most productive and resource rich area of the state. District Farrukhabad is situated in central U.P.. Four blocks of the district were selected for the present investigation. One village from each block was selected randomly for collection of data and 30 respondents from each village were selected for the study. Therefore, 120 respondents were selected for the investigation. Analysis of farming system was the major variable. Percentage & X^2 were the statistical tools for calculation of data.

RESULTS AND DISCUSSION

1. Distribution of respondents on the basis of social participation: It is clear from table-1 that majority of respondents having

However, about 10 percent of cows and 5% buffaloes remained untreated for these diseases. Rajendran and Prabaharan (2000) were also found almost similar results. The other main expenditure item on diary farm was the use of oxytocin for the let down of milk in some milch animals. The use of oxytocin was found to be very less for cows while its use in buffaloes was found to be 0.36 ampoules per animal. Its use was found to be higher on small category of milk producers compared to large categories (table 4). On an average 13.70 per cent of cows and 54.02 per cent of buffaloes were injected with oxytocin for the let down of milk during milking time.

CONCLUSION

The study concluded that the common green fodders were berseem, sugarcane top, maize, chari. bajra and green grasses and wheat straw was mainly supplied round the year. The rural farmers had no knowledge regarding scientific livestock feeding, improved varieties of fodder seeds etc. So the farmers are needed to be educated for scientific dairy farming for better health and production of the animals. The facilities of A.I. and vaccination were not available at the doorstep of the farmers; also, they were unaware of the merits of these improved technologies. Thus, Government and non-government agencies should draw their attention towards these problems in rural areas for development of animal husbandry.

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SOCIO-ECONOMIC AND PSCHYCOLOGICAL CHARACTERISTICS OF THE WOMEN ENTREPRENEURS OF MANIPUR

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ABSTRACT

The present study was conducted in Ima Market, Imphal West District of Manipur using the Ex-post facto research design. A sample size of 150 respondents was selected through proportional random sampling from the seven categories of enterprises of the population. The data collected were then analyzed using appropriate statistical tools namely, frequency, percentage, mean, standard deviation simple correlation coefficient and multiple regressions. Majority (66.60%) of the women entrepreneurs in Ima market was middle aged lying in the age group of 38 to 62 years and most of them (23.30%) were illiterate. It was found that most (47.30%) of the women belonged to medium size of family with 4 to 6 members in the family. 62.00 per cent of them were found to have medium total annual income earning Rs.73, 000 to 2, 19,000 annually and majority (58.60%) of the women was found to lie in the medium socio-economic status. Similarly, (70.00%) of the women in Ima Market were married. Most (45.30%) of them established and started their enterprises with their own money without any outside sources. Most of the women entrepreneurs were found to have medium decision making ability (62.00%) and 63.30 per cent of them were found to have medium managerial ability. The results of the investigation revealed that variables like education, family size, annual average income, socio-economic status were positive and significantly correlated with the extent of entrepreneurial behaviour of women. Further, on regression analysis, it was found that the variables like education, family size, and socio-economic status had significant influence over the extent of entrepreneurial behaviour of women and therefore, were important predictors for any variation in the extent of entrepreneurial behaviour.

Key words: *Women Entrepreneurship; decision making; need for independent; level of aspiration*

Women play a very important role in the economic development. They are involved in business activities at all levels making important contributions to economic growth. Nowadays, Manipuri women are playing an important role in contributions to the economy that were previously considered male domain. While many women are succeeding in business, they are still constrained by the gender values, norms and stereotypes in the environment in which they operate. Because of their reproductive roles they tend to be responsible for business as well as for most of the unpaid work in the household (domestic responsibilities such as cooking, cleaning and

caring for children and other family members). They have less time to devote to their work and they are less mobile. Women also face social and cultural barriers, because the overall perception in society is that a woman's main duty is to be a good housewife and mother. The specialists in economic development have considered entrepreneurship development as a possible approach to empowerment of women. A women as an entrepreneur is economically more powerful than as a mere worker, because ownership not only confers control over assets but also gives her the freedom to take decision. This will also uplift her social status in the society. Women owned business are highly increasing in the economics of almost all the countries. The hidden entrepreneurial potentials of women have gradually been changing with the growing sensitivity to the role and economic status in the society. Skill, knowledge and adaptability in business are main reasons for women to emerge into business ventures.

The centuries-old Ima market in Imphal is the world's only market where shops are owned, run and controlled by women which stands as a very good example of women entrepreneurial behaviour in the world. The present study is concerned with Ima (mother) keithel (market) where about 3500 women are carrying out their entrepreneurial activities. Ima-market is one of the biggest women market in the world which is situated at the Imphal west district of Manipur. The entire stalls are run and managed by women alone. A unique feature in the Ima market is that goods and commodities which are sold by the women are mostly locally produced. They collect produce from the neighboring kitchen gardens, lakes, pond, hills and farmlands and handicrafts in their areas and come for trade in the market. The Ima-keithel opens from morning till night.The Ima keithel serves as the means of livelihood for women who come from different areas to sell their goods. All the women traders do not have same intentions. Some come to sell their goods only for money, but some come to this market not only for money but to get pleasure out of it. But majority of the women entrepreneurs are involved in trading due to economic obligation to support their families. The present study was conducted in Ima keithel which is one of the most important places for business in Manipur which contributes to the economy of the state. In view of above facts and notions the present study was carried out with the specific objective viz. to study was socio-economic and psychological status of the women entrepreneurs of Ima Market in Imphal West District of Manipur.

MATERIALS AND METHODS

Imphal West District of Manipur has been selected purposively for investigation of the study because the women's market is situated in the Imphal West of Manipur. Ima Market is considered as the biggest market in Asia dominated by women traders. In the present study, agro-based products or agricultural related enterprises were selected purposively. The selected agro-enterprises consisted of fish, indigenously processed foods, vegetables and fruits, handlooms and textiles, seeds and planting materials, agricultural implements and inputs and other agricultural products. Total a sample size of 150 respondents was selected through proportional random sampling from the seven categories of enterprises of the population. The collected data were subjected for analyzing by using appropriate statistical tools namely, frequency, percentage, mean, standard deviation simple correlation coefficient and multiple regressions.

Table 4: Status of Management Practices on different Categories of Milk Producers

Groups	Numbers	Breeding Management			Vaccinated Animals (%)	Disease Management				Per animal oxytocin ampoules used	No. of Animals for which oxytocin used (%)
		Milch Animal Conceived with				Vertinary care Provided					
		A.I.	Natural Service	Natural Service after AI failure		Vet. Treatment for Major Disease	Indigenous Treatment for Disease	Untreated			
Cow Rearers											
Small	61	14.17	85.83	0.00	33.33	60.83	54.17	12.50		0.05	7.46
Medium	30	12.50	81.50	6.00	37.50	67.50	37.50	0.00		0.05	15.09
Large	17	14.29	82.29	3.43	25.00	75.00	75.00	12.50		0.04	19.15
Overall	108	13.73	82.69	3.58	32.01	65.01	55.01	10.00		0.04	13.70
Buffalo Rearers											
Small	39	15.88	53.24	30.38	70.83	90.50	79.17	8.33		0.42	42.39
Medium	37	2.26	75.85	21.29	75.00	100.00	37.50	0.00		0.28	52.78
Large	16	7.86	55.83	36.31	50.00	92.50	25.00	0.00		0.38	61.26
Overall	92	7.74	60.95	31.32	67.52	93.00	60.02	5.00		0.36	54.02

Note: Figures need not tally 100 as there was repetition of practices/treatment on milch-animals.

around 80 % of the livestock owners. The proportion of cows conceived with A.I. was merely 13.73 percent while that of buffaloes, it was nearly 7.74%. The proportion of buffaloes conceived with A.I. was higher on large farms, it might be due to the fact that the bulls for natural services were not easily available for these milk producers. A.I. in buffalo was not found to be very effective as 31.32 per cent buffaloes were not conceived with AI, and had to resort to natural service almost similar findings were observed by Singh et.al. (1989).

It was also revealed that infectious diseases like FMD. mastitis, pneumonia and heamorrhagic septicaemia (HS) were found in the area, vaccination against infectious diseases was provided to milch animals. The proportion of buffaloes vaccinated were higher (67.52%) compared to cows (32.51%). For major diseases such as gasto-enteritis, prolapse of uterus, retained placenta, dystocia and pneumonia, the veterinary care in the form of medicines etc. was provided to 25.01 per cent cows and 93.00 per cent buffaloes. For other diseases and disorders such as worms and loss of apatite, 55.01 per cent cows and 60.02 per cent buffaloes were provided indigenous treatment by the milk producers.

Table 3: Feed and fodder availability on different category of milk producers.

Groups	Nos.	Feed availability		Green fodder feeding (%)	
		Owned (%)	Purchased (%)	Daily	Well chaffing & mixing
Cow Rearers					
Small	61	83.33	16.67	75.00	16.67
Medium	30	87.50	12.50	100.00	25.00
Large	17	100.00	--	100.00	12.50
Overall	108	87.52	12.50	95.00	17.50
Buffalo Rearers					
Small	39	91.67	8.333	75.00	16.67
Medium	37	100.00	--	75.00	25.00
Large	16	87.50	12.50	100.00	50.00
Overall	92	92.52	7.50	80.02	25.01

RESULTS AND DISCUSSION

The data presented in table-1 reveals that most of the women engaged in agro-based enterprises belonged to the age group of 38 to 62 years of age (66.60 %), and (16.70 %) women

Table 1: Socio-Economic and Psychological Status of Women Entrepreneurs

N=150

S.N.	Parameters	Category	Frequency	Percentage
1.	**Age**	Young (<38)	25	16.70
		Middle(38 to 62)	100	66.60
		Old (>62)	25	16.70
2.	**Education**	Illiterate	35	23.30
		Can read only	20	13.30
		Can read and write	6	04.00
		Primary	5	03.30
		Middle	31	20.70
		High school	21	14.00
		College and above	32	21.30
3.	**Family Size**	Small	10	06.70
		Medium	71	47.30
		Large	61	40.60
		Very large	8	05.40
4.	**Marital Status**	Single	0	00.00
		Married	105	70.00
		Widow	35	23.30
		Divorced	10	06.70
5.	**Annual Income**	Low(<73000)	23	15.40
		Medium (73000 to 219000)	93	62.00
6.	**Socio-Economic Status**	High (>219000)	39	22.60
		Low	34	22.67
		Medium	88	58.67
		High	28	18.66
7.	**Sources of Finance**	Banks/other financial Institution	2	01.30
		Friends/partners	19	12.70
		Family/relatives	56	37.30
		No outside source	68	45.30

S.N.	Parameters	Category	Frequency	Percentage
8.	**Decision Making Ability**	Sensaanbi	5	03.40
		Low	50	33.40
		Medium	93	62.00
9.	**Managerial Ability**	high	7	04.60
		Low	52	34.60
		Medium	95	63.30
10.	**Risk Bearing Ability**	high	3	02.00
		Low	19	12.70
		Medium	73	48.60
11.	**Problem Recognition Ability**	high	58	38.70
		Low	48	32.00
		Medium	100	66.70
12.	**Need for Independence**	High	2	01.30
		Low	45	30.00
		Medium	88	58.60
13.	**Achievement Motivation**	High	17	11.40
		Low	39	26.00
		Medium	73	48.60
14.	**Level of Aspiration**	High	38	25.40
		Low	20	13.40
		Medium	114	76.00
		High	16	10.60

belonged to the age group of 32 to 38 and another (16.70 %) were found to belong in the age group of 62 to 75 years (Khumlo, 2009). The maximum number of the women were illiterate with (33.30 %) followed by those educated up to middle level with (23.30 %) which was followed by the percent of women educated up to the primary level with (16.00 %). 11.30 per cent of the women can read only. The percentage of respondents educated up to high school level were (7.3 %) and 4.7 per cent of the women were educated up to the college level. 4.0 per cent of women can read and write. It is clear from the findings that majority of the women entrepreneurs have poor educational background, having no other option for other engagement but entrepreneurial or marketing activities(Rajendra,2002).In the pooled sample, it was observed that majority of the respondents (44.70 %) belonged to medium familyfollowed by large family with 42.00 per cent very large family was found to be 06.70 per cent,

Table 2: Average Quantity (kg/day/animal) of feeds and fodder fed to milch animals during different seasons

Groups		Concentrates				Green Fodder				Dry Fodder			
		Summer	Winter	Rainy	Overall	Summer	Winter	Rainy	Overall	Summer	Winter	Rainy	Overall
Cow Rearers													
Small		2.55	2.13	2.00	2.202	14.12	19.79	17.88	17.895	4.98	3.89	4.70	4.365
Medium		3.24	2.60	2.85	2.822	14.30	19.85	18.10	18.025	5.35	4.40	4.76	4.727
Large		3.56	2.80	3.00	3.040	14.50	20.70	19.90	18.950	5.60	4.65	4.95	4.961
Overall		3.10	2.50	2.60	2.675	14.30	20.10	18.60	18.275	5.30	4.30	4.80	4.675
Buffalo Rearers													
Small		5.09	4.31	4.92	4.657	14.63	21.67	19.57	19.385	7.35	5.99	5.82	6.287
Medium		6.10	4.96	5.45	5.367	15.40	23.50	21.40	20.950	8.00	6.05	6.50	6.650
Large		6.50	5.15	5.60	5.600	15.80	24.70	22.60	21.950	8.09	6.20	6.85	6.835
Overall		6.05	4.90	5.40	5.312	15.40	23.60	21.50	21.025	7.90	6.10	6.50	6.650

23.60 kg and 6.10 kg in winter. 6.05. kg. 15.40 kg and 7.9 kg in summer season and 5.40 kg, 21.50 kg and 6.50 kg. in rainy season, respectively.

This analysis thus indicates that less concentrates were fed to milch animals in winter and rainy seasons due to the availability green fodders, while in summer season, the lack of green fodders was compensated with the feeding of more concentrates to animals. The quantity of dry fodder fed to milch animals was maximum in summer season and was found to be 5.30 kg and 7.90 kg for cows and buffaloes, respectively. Pooled data indicates that cows were fed 4.675 kg of dry fodder and 18.275 kg of green fodder while, buffaloes were fed 6.650 kg of dry fodder and 21.025 kg of green fodder per day. Milk producers' category-wise, feed and fodder offered to their animals by small farmers was lower as compared to the large farmers (Table-2). It might be due to the small farmers had less land sine, were unable to feed their animals with full belly. Rout, et al. (1980) also revealed almost similar findings.

A look into 'Table-3 reveals that 12.50% of cow rearers and 7.50% of buffalo-rearers were not having their own-feeds and they had to purchase feeds for milch animals. Owing to small size of land holdings, the area under fodder crops was also less. In addition, there were some landless dairy owners also. All these factors compelled the producers not to store straw for long time and they had to depend on market for feeds and fodder, particularly in Sarojninagar block, in the periphery of urban area. About 87% owners were of the view that feeds and fodders available with them were deficient and as a result the consumption of feeds, concentrates and green fodder was less on their farms. These results are in line with the findings of Rai and Gangwar (1976).

The straws fed to animals were untreated despite the fact that the techniques of urea treated straw is well advocated for. The green fodder was not available for daily feeding on small farms as about 75 per cent of small milk producers were found not to fed green fodder daily to their milch animals. The chaffing of green fodder and mixing with straw was followed by nearly 17.50 percent of cow-rearers and 25.01 per cent of buffalo-rearers. Majority of the milk producers provided feed to animals in almost dry form after mixing small quantity of water. Soaking of feed before feeding of animals was uncommon. The analysis thus revealed that the feeding practices followed by small farmers were sub-optimal. The findings in accordance with these were also observed by Sharma et.al. (1987) and Chikara and Gangwar (1975). So, there is an urgent need to educate the farmers for correct feeding practices, as it plays a vital role in strengthening the economy of farm families.

Management Practices, Veterinary Care and Hygiene

Management practices responsible for better milk yield studied were related to breeding management, disease management, veterinary care, housing and 'general hygiene of the milch animals. A look into the Table-4 reveals that natural service on heat detection was the common breeding system adopted by

while06.60 per cent of the respondents were found belonging to small family(Nirmala,2000) andJhamtani et al., (2003).It is reported that majority of the women entrepreneur were married (70.00 %) which were followed by (23.30%) of women who were widows and (06.70%) of the women entrepreneurs were divorcees. None of the women were single. Only married women were found in the market, appropriately called Ima (mother's market). Similar findings were reported by Rajani and Sarada (2008), Khumlo (2009).The table shows that majority of the women entrepreneurs belonged to the medium income group (62.00 %) followed by womenbelonging to high income group (22.60 %) and 15.40 per cent of the women entrepreneurs belonged to low income group (Khumlo,2009). Table-1 reveals that majority of the women entrepreneurs in Ima market belonged to medium socio-economic status (58.67 %) which was followed by women belonging to low socio-economic status (22.67 %) and 18.66 per cent of the women entrepreneurs were found to belong in the high socio-economic status.Similar findings were reported by Sapam (2009).

Shows that majority of the women run their enterprise with their own money (45.30 %) followed by women who takes financial help to run their enterprise from family and relatives (37.30 %)and 12.70 per cent of the women entrepreneurs in Ima market took financial help from friends or partners and 03.40 per cent of them take help from Sensaanbi (money lender) and only 01.30 per cent of the women entrepreneurs take help from banks and other financial institutions(Kshetrimayum, 2002).

The data presented in table-1 it waspredicted that majority of the women entrepreneurs (62.00 %),were medium decision making abilitywhich was followed by (33.33 %) in case of low category and only and only 04.67 per cent of the women had high decision making ability in the Ima market. This was due to the good amount of knowledge and information they have. They take decisions taking their personal, social and business situation into account(Sapam,2009).Table revealed that maximum number of the women entrepreneurs (63.30 %) had medium managerial ability. While 34.60 per cent and 02.00 per cent were found tomanagerial ability in the low and high category.

Indicates that majority of the women entrepreneurs(48.60were found to have medium risk bearing ability followed by 34.60 per cent respondents having low risk bearing ability, and 12.70 per cent were found to have high risk bearing ability. Similar findings were reported by Banerjee (1996), Bhagyalaxmi et al., (2003), Suresh (2004).The data presented in the table-1 reveals that maximum number of the women entrepreneurs(66.70%) were found to have medium problem recognizing ability followed by 32.00 per cent of the women entrepreneurs having low problem recognizing ability and only 01.30 per cent were found to have high problem recognizing ability. Similar findings were reported by Banerjee (1996).

Table-1 indicates that 58.67 per centwomen entrepreneurswere found to have medium need for independence followed by 30.00 per cent and 11.40 per cent of the women entrepreneurs were found to have low and high need for independence respectively. Similar findings were reported by Sapam (2009). Reveals that 48.67 per cent women entrepreneurs were found to having in the medium achievement motivation followed by 26.00 per cent women entrepreneursfalling in the category of low achievement motivation and 25.40 per cent had high achievement motivation. Achievement

motivation is the need for success. (Sapam,2009). The Table-1 indicates that maximum number of the women entrepreneurs (76.00 %) had medium level of aspiration. While 13.40 per cent and 10.60 per cent were found to fall in the category of low and high level of aspiration respectively (Khumlo,2009).

Table 2: Relationships between the personal socio-economic and psychological characteristics of the women entrepreneurs with their extent of entrepreneurial behaviour

Sl. No.	Variables	Correlation co-efficient
1.	Age X_1	.103 NS
2.	Education X_2	.511**
3.	Family size X_3	.211**
4.	Total annual income X_4	.491**
5.	Socio-economic status X_5	494**

** Correlation is significant at 0.01 level of probability.

There was significant and positive correlation between the entrepreneurial behaviour of the women entrepreneur and their education. It indicates that higher the level of education was the extent of entrepreneurial behaviour of the women entrepreneurs. The size of the family was found to having significant correlated with the entrepreneurial behaviour of the women entrepreneurs. This reveals that increase in family size increases the economic need. The total annual income was found to having significant correlation with the entrepreneurial behaviour of the women entrepreneurs. This shows that increase in total annual income increases the entrepreneurial behaviour. There was positive and significant correlation of the socio-economic status of the women entrepreneur and their entrepreneurial behaviour. There was no correlation between the age and the entrepreneurial behaviour of the women entrepreneur which reveals that age was not related to entrepreneurial behavior of women entrepreneurs.

Table 3: Regression co-efficient of socio-economic characteristics of women entrepreneur with their extent of entrepreneurial behaviour

Sl.No.	Variables	beta	Regression co-efficient	Std. error	't' value
1.	Age X_1	0.060	0.360	0.077	0.918
2.	Education X_2	0.383	0.000**	0.405	5.668
3.	Family size X_3	0.118	0.077*	0.434	1.779
4.	Total annual income X_4	0.138	0.243	0.011	1.171
5.	Socio-economic status X_5	0.245	0.037*	0.632	2.106

** Significant at 0.01 level of probability

*Significant at 0.05 level of probability

producers) were randomly selected according to the probability proportional to the total number of households under each category.

The data were collected in the well developed and pre-tested schedules through personal interview of the respondents. Data from secondary sources and observations were also collected.

RESULTS AND DISCUSSION

Feed Consumption and Feeding Pattern

The table 1 revealed that there were no grazing facilities available due to intensive cultivation and non-availability of pasture lands. Feeds and feeding practices were found almost similar among all the category of farmers with slight difference in amount of feeds and fodders fed to the animals during various seasons. The common green fodders were berseem. sugarcane top and green mustard in winter; maize, chari, bajra and green grasses in summer and chari, maize, bajra and green grasses in rainy season. Whereas, main dry fodders fed to animals in all the seasons was bhusa (wheat straw) while paddy straw was predominately fed in winter season. The concentrates fed were ready-made feeds, wheat grains, wheat chokar, arhar chuni, oil cakes and gram in all the seasons. The ready-made animal feed (Pashu Ahar) was fed by meager number of small category milk-producers but common amongst large milk producers.

Quantity of Feeds and Fodders fed to Milch Animals

Table-2 shows that the amount of concentrates, green fodder and dry fodder fed to cows per day was 2.50 kg, 20.10 kg and 4.30 kg in winter season; 3.10 kg, 14.80 kg and 5.30 kg in summer season and 2.60 kg, 18.60 kg and 4.80 kg in rainy season respectively. The amount of concentrates, green fodder and dry fodder fed to buffaloes per day was 4.90 kg.

Table 1: Feeds and Fodders fed to milch animals during different seasons

Season	Feeds (Concentrates)	Fodders	
		Green	Dry
Winter Season	Wheat chokar, oil cakes, Gram, Arhar-chuni etc.	Barseem, Green mustard, sugarcane top	Wheat Straw (Bhusa), paddy Straw
Summer Season	Wheat chokar, oil cakes, Gram etc.	M.P. Chari, maize, bajra, green grasses	Wheat Straw
Rainy Season	Wheat chokar, Arhar-chuni, Gram, oil cakes, etc.	Chari, maize, green grasses, lobia+chari, bajra	Wheat Straw

Our country has had rich tradition in dairying since the time of Lord Krishna. Dairying has been inherent in Indian culture for centuries. Milk and milk products have always been an integral part of our consumption habits. In the vast field of animal husbandry, the contributions of dairying have been most significant in terms of income and employment generation.

Dairying in India is rural-based and land saving enterprise. It offers more favourable opportunities of employment as compared to crop production. Dairy farming provides the landless labourers as well as the marginal farmers, a steady source of income, enhancing their earning and enabling them to improve their standard of living. Cattle and buffaloes are the integral parts of mixed farming systems in India. India accounts for a significant share of world's livestock resources with nearly 57% of world's buffaloes, 16.5 % of cattle and 16.2 % of goats.

Despite all the dairy development programmes, the unorganised sector remained the key player in milk marketing and the proportion of milk handled by the unorganized sector remained quite high. It is clear that the development of Indian dairy sector during the last 35 years has been largely policy induced and has occurred in a closed economy environment. The situation is fast changing and as India moves towards globalization, the self sufficiency in dairy sector achieved through millions of milk producers is likely to be threatened due to distortions in the world markets. In other words, the milk producers' prosperity would be affected which in turn may affect changes in production and consumption pattern of milk at producers' level. The low milk production with poor quality is mainly due to non-adoption of scientific dairy husbandry technologies especially in rural areas. With this background a study has been conducted to access dairy husbandry practices followed by livestock owners.

MATERIALS AND METHODS

The present study was conducted in Lucknow district of the U.P. state because Lucknow falls in Central Plain Agro-climatic zone of the state and it is better representative of Uttar Pradesh. Lucknow district comprising of eight blocks. Out of these, two blocks namely. Mohanlalganj and Sarojninagar were selected randomly for detailed investigation as the first stage sampling units. The selection of villages formed the second stage in the sampling plan. Five villages were selected randomly from each chosen block. The milch animal keepers in the selected villages were viewed as consisting of 2 strata viz., (i) households having cows (>80%milk production from cows) and (ii) households having buffaloes (>80%milk production from buffaloes). The households from both the strata were further classified into small, medium and large category on the basis of the number of milch animals (cows/buffalos) reared by them. Small category was considered as households rearing one to three milch animals, medium category rearing 4 to 6 milch animals and large category as more than six milch animals. Two hundred producers (108 cow milk producers and 92 buffalo milk

The table-3 shows that out of five independent variables, 3 namely education, family size and socio-economic status were found to have significant effect on the extent of entrepreneurial behaviour of the women entrepreneur, the regression co-efficient being b = 0.000, 0.077, 0.037 respectively. It was also inferred that with unit change in education added to 0.383 unit changes in the value of entrepreneurial behaviour, similarly a unit change in family size and socio-economic status has reflected 0.118 and 0.245 unit change respectively in the entrepreneurial behaviour.It was observed that education emerged as the most significant characteristic (b=.000) in predicting the extent of entrepreneurial behaviour. The Rvalue (0.645) suggests that all the independent variables jointly contributed 64.5 per cent towards the variation in extent of entrepreneurial behaviour. The F value (20.502) was also found significant at 0.01 level of probability. This indicates the significant effectiveness of these five independent variables in predicting the extent of entrepreneurial behaviour of women entrepreneur when all the independent variables were functioning jointly. Further, the variables whose regression co-efficient values were found significant (education, family size, socio-economic status) could be termed as good predictors of extent of entrepreneurial behaviour. Hence, (GH2) that the entrepreneurial behaviour of the women entrepreneur can in part be predictedfrom the independent variable selected for the study is accepted.

CONCLUSION

Majority (66.60 %) of the women entrepreneurs in Ima market was middle aged lying in age group of 38 to 62 years and most of them (23.30 %) were illiterate. It was found that most (47.30 %) of the women belonged to medium size of family with 4 to 6 members in the family. 62.00 per cent of them were found to have medium total annual income earning Rs.73, 000 to 2, 19,000 annually and majority (58.60%) of the women was found to lie in the medium socio-economic status. Similarly, (70.00%) of the women in Ima Market were married. Most (45.30 %) of them established and started their enterprises with their own money without any outside source. Most of the women entrepreneurs were found to have medium decision making ability (62.00%) and 63.30 per cent of them were found to have medium managerial ability. The results of the investigation revealed that variables like education, family size, annual average income, socio-economic status were positive and significantly correlated with the extent of entrepreneurial behaviour of women. Further, on regression analysis, it was found that the variables like education, family size, and socio-economic status had significant influence over the extent of entrepreneurial behaviour of women and therefore, were important predictors for any variation in the extent of entrepreneurial behaviour.

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MANAGEMENT PRACTICES ADOPTED BY DAIRY OWNERS OF LUCKNOW DISTRICT IN UTTAR PRADESH

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ABSTRACT

An attempt has been made to study the management practices followed by dairy farmers having cattle and buffalo as dairy animals. For the purpose, two blocks of Lucknow district of Uttar Pradesh having better dairy animals had been selected. Restoring proportionate sampling, 108 cow milk producers and 92 buffalo milk producers were finally selected for detailed investigation. The respondents were then categorized under small, medium and large farmers on the basis of number of dairy animals. The data was collected through direct interviewing of the respondents as well as through secondary sources and observations also. The study revealed that feeds and feeding practices were found almost similar among all the category of farmers. The common green fodders were berseem, sugarcane top and green mustard in winter; maize, chari, bajra and green grasses in summer and chari. maize, bajra and green grasses in rainy season. Whereas, main dry fodders fed to animals in all the seasons was bhusa (wheat straw) while paddy straw was predominately fed in winter season. The amounts of concentrates, green fodder and dry fodder fed to cows per day were 2.50, 20.10 and 4.30 kg in winter season; 3.10. 14.80 and 5.30 kg in summer season whereas 2.60, 18.60 and 4.80 in rainy season, respectively. 12.50% of cow rearers and 7.50% of buffalo-rearers were not having their own-feeds and they had to purchase feeds for milch animals. Owing to small size of land holdings, the area under fodder crops was also less. Majority of the small farmers were followed natural breeding policy. The common diseases in the study area were F.M.D., H.S. pneumonia, gastroenteritis etc. Vaccination against the infectious diseases were followed but in low proportion. The study concluded that the livestock owners are needed to be educated regarding scientific dairy husbandry practices for strengthening of socio-economic status of dairy owners' vis-a-vis development of animal husbandry.

Key Words: Dairy, husbandry, management practices.

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SENSORY EVALUATION OF SHRIKHAND COLLECTED FROM DIFFERENT SOURCES AND STORED AT DIFFERENT PERIOD AND TEMPERATURE

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ABSTRACT

Keeping in view, present and future market share of indigenous milk product, Shrikhand is an example of successful large scale operation in Indian marketing. As a result with the increase in graph of the sale and market share of Shrikhand, need was felt to know the quality of Shrikhand sold in other cities of Maharashtra State, accordingly the experiment was planned to study the effect of source, storage interval and temperature on five sensory characters (viz. flavour, body & texture, acidity & texture, colour & appearance) of Shrikhand collected from vendors of Akola and Amravati districts compared with laboratory shrikhand. The result revealed that the fresh laboratory Shrikhand received maximum score over rest of Shrikhand samples, on the basis of grading scale, laboratory Shrikhand secured excellent A grade while OSM Shrikhand was good B grade and vendor's Shrikhand fell in fair C grade quality. The laboratory Shrikhand was possessing rich, pleasing, flavour due to more fat content followed by OSM Shrikhand and vendor Shrikhand. Moreover laboratory Shrikhand was smooth in body with uniform texture while, vendor Shrikhand BT was weak sticky with poor texture and granular body was found in OSM Shrikhand. It was also observed that acceptability of Shrikhand was affected significantly by source, storage temperature and storage interval. There was significant decrease in sensory quality of Shrikhand with the increase of storage period.

Key words: *Evaluation, shrikhan stored, temperature*

Fermented milk products like curd, Dahi and butter milk have acquired unique position in Indian dairies. They are well recognized for their therapeutic and nutritive value. Shrikhand is one of the fermented milk product belongs to this group. It is fermented and coagulated milk product as defined by Patel and Chakraborty (1988). A popular product in Maharashtra and Gujarat being served as sweet dish during religious and social functions. However its popularity has been spread over across the country due to wide distribution of the product manufacture by many famous dairies viz, Amul, Warna, Arey etc. Discussing present and future market share of indigenous milk product in India marketing of Shrikhand by National Dairy Development Board is an

example of successful large scale operation for indigenous product (Kurian 1991). As a result with the increase in graph of the sale and market share of Shrikhand, need was felt to know the quality of Shrikhand sold in other cities of Maharashtra State with this view the experiment was planned to study the effect of source, storage interval and temperature on sensory characters of Shrikhand

MATERIALS AND METHODS

The sensory evaluation of Shrikhand samples of two different treatments were carried out by panel of five judges. As far as possible same judges were kept to avoid the possibility of variation. The evaluation was done by using the score card suggested by Pal and Gupta (1985) which took care on the aspects like general appearance, flavour, body and texture and other guidelines for acceptance of product.

RESULTS AND DISCUSSION

The overall acceptability of Shrikhand was judged in reference to its flavour, body and texture (BT), colour and appearance (CA) and acidity and taste (AT) by allocating the score.

Score card for judging Chakka and Shrikhand

Attribute	Maximum score
Flavour	45
Body and texture	35
Acidity and taste	10
Colour and appearance	10
Total	**100**

Note : 1. In order to make the product acceptable, it must score a minimum of 60% for each attribute.

2. Following deductions from score for different sensory attributes of Chakka and Shrikhand based on defect and intensity were asked to judges during evaluation process.

Sensory attribute	Defect	Intensity of defect		
		Slight	Definite	Pronounced
Flavour (perfect score 45)	High acid/green cheesy bitter, metallic	7 10	9 13	11 16
Body and texture (perfect score 35)	Curdy, grainy, thin/thick body ropy, wheying off	1 3	3 6	5 9
Acidity (perfect score 10)	High acidity, low acidity	1	3	5
Colour and appearance (perfect score 10)	Uneven/unnatural colour	1	3	5

Table 2.4 : Effect of seed treatment with bio-agents on seed germination, shoot length, root length and wilt incidence of pumpkin.

Treatment	Doses (g/kg seed)	Percent seed germination	Shoot length (cm)	Root length (cm)	Percent wilt incidence
T. viride	6	82.00 (65.35)	5.6	8.9	27.0 (31.53)
T. harzianum	6	80.00 (63.8)	5.1	8.6	30.00 (33.05)
G. virens	6	79.00 (62.94)	4.9	8.2	35.0 (36.24)
Penicillium citrinum	4	76.00 (60.75)	4.6	8.0	40.0 (39.21)
Aspergillus niger	4	74.00 (59.37)	4.5	7.5	45.0 (42.12)
A. flavus	4	70.00 (56.82)	4.0	7.0	50.0 (43.12)
Control	--	66.00 (54.37)	3.8	6.8	60.0 (50.78)
CD (P = 0.05)		(6.4)	0.30	0.45	(4.7)

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Tablle 2.2 : Effect of seed treatment with bio-agents on seed germination, shoot length, root length and wilt incidence of muskmelon

Treatment	Doses (g/kg seed)	Percent seed germination	Shoot length (cm)	Root length (cm)	Percent wilt incidence
T. viride	6	88.00 (70.34)	4.6	7.4	25.0 (29.94)
T. harzianum	6	86.00 (68.26)	4.5	7.1	27.5 (31.53)
G. virens	6	82.00 (64.91)	4.2	6.8	30.0 (33.17)
Penicillium citrinum	4	79.00 (62.99)	3.9	6.6	40.0 (39.21)
Aspergillus niger	4	76.00 (60.75)	3.6	6.4	45.0 (42.12)
A. flavus	4	70.00 (56.94)	3.4	6.2	47.5 (43.55)
Control	--	65.00 (53.75)	3.0	6.0	60.0 (50.83)
CD (P = 0.05)		(4.90)	0.54	0.93	(4.7)

Figures in parentheses are transformed `Arc Sine' values.

Table 2.3 : Effect of seed treatment with bio-agents on seed germination, shoot length, root length and wilt incidence of bottle gourd.

Treatment	Doses (g/kg seed)	Percent seed germination	Shoot length (cm)	Root length (cm)	Percent wilt incidence
T. viride	6	80.00 (63.80)	5.1	8.6	25.0 (29.94)
T. harzianum	6	75.00 (60.05)	4.9	8.0	30.00 (33.17)
G. virens	6	70.00 (56.82)	4.7	7.8	37.5 (37.71)
Penicillium citrinum	4	68.00 (55.63)	4.5	7.5	40.0 (39.21)
Aspergillus niger	4	65.00 (53.75)	3.8	7.0	45.0 (42.12)
A. flavus	4	62.00 (51.94)	3.4	6.8	50.0 (45.00)
Control	--	60.00 (50.78)	3.0	6.0	60.0 (50.82)
CD (P = 0.05)		(4.9)	0.27	0.46	(4.4)

The score comprised of flavour (45), BT (35), CA (10) and AT (10) making a total of 100 points. The salient features of overall acceptability are summarised below.

The fresh laboratored Shrikhand (LS3) received maximum score (91.75) over rest of Shrikhand samples. Whereas, the score of OSM Shrikhand (C1S1 and C2S1) from both cities was significantly more than that of vendor's Shrikhand (C1S2 and C2S2) from both cities,

Table 1 : Effect of source, storage temperature, storage interval and their interactions on the flavour score of Shrikhand (out of max 45)

Storage interval (days)	Different sources Shrikhand stored at different temperatures										Days pooled means
	C_1S_1		C_1S_2		C_2S_1		C_2S_2		LS_3		
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
1	39.58	39.58	34.87	34.87	39.74	39.74	34.02	34.02	40.52	40.52	37.746
2	37.19	37.86	33.14	33.47	38.04	38.73	31.84	32.74	37.70	39.61	36.035
3	34.31	37.77	29.06	32.85	34.02	38.12	29.12	32.12	33.93	39.24	34.057
4	29.84	37.42	25.80	32.65	30.61	37.67	25.64	31.49	30.64	38.74	32.053
5	26.98	36.98	23.88	31.85	26.73	37.12	22.94	31.13	26.52	38.04	30.216
Source x Storage temperature	33.583	37.926	29.351	33.138	33.830	38.280	28.715	32.302	33.863	39.227	
Source pooled means	35.754		31.245		36.055		30.509		36.545		

Combined effect of storage temperature and storage interval on flavour score of Shrikhand

Days	1	2	3	4	5	Temperature pooled means
T_1	37.746	35.586	32.092	28.506	25.413	31.869
T_2	37.746	36.484	36.023	35.600	35.020	36.175

Attribute	Source	Storage temperature	Storage interval	Source x Storage Temp.	Source x Storage interval	Storage Temp. xStorage interval
Results	Sig	Sig.	Sig.	Sig.	NS	Sig.
SE (m) ±	0.163	0.103	0.163	0.231	0.365	0.231
CD at (5%)	0.452	0.286	0.452	0.640	-	0.640
CV (%)	03.39					

Table 2 : Effect of source, storage temperature, storage interval and their interactions on the Body and texture (BT) score of Shrikhand (out of max 35)

Storage interval (days)	Different sources Shrikhand stored at different temperatures										Days pooled means
	C_1S_1		C_1S_2		C_2S_1		C_2S_2		LS_3		
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
1	33.58	33.58	30.87	30.87	33.74	33.74	30.02	30.02	34.02	34.02	32.446
2	31.19	31.86	29.14	29.47	32.04	32.73	27.84	28.74	31.20	33.11	30.735
3	28.31	31.77	25.06	28.85	28.02	32.12	25.12	28.12	27.43	32.74	28.757
4	23.84	31.42	21.80	28.65	24.61	31.67	21.04	27.49	24.14	32.24	26.753
5	21.39	30.98	19.88	27.85	20.73	31.12	18.94	27.13	20.60	31.51	25.016
Source x Storage temperature	27.666	31.926	25.351	29.138	27.830	32.280	24.715	28.302	27.479	32.727	
Source pooled means	29.796		27.245		30.055		26.509		30.103		

Combined effect of storage temperature and storage interval on Body and texture (BT) score of Shrikhand

Days	1	2	3	4	5	Temperature pooled means
T_1	32.44	30.28	26.79	23.20	20.31	26.608
T_2	32.44	31.18	30.72	30.30	29.72	30.875

Attribute	Source	Storage temperature	Storage interval	Source x Storage Temp.	Source x Storage interval	Storage Temp. xStorage interval
Results	Sig	Sig.	Sig.	Sig.	NS	Sig.
SE (m) ±	0.163	0.103	0.163	0.231	0.366	0.231
CD at (5%)	0.453	0.286	0.453	0.640	-	0.640
CV (%)	4.02					

the score being ranging in between 87.98 to 88.35 for OSM Shrikhand and 77.91 to 78.89 points for vendor Shrikhand. On the basis of grading scale suggested by Desai et. al (1985), laboratory Shrikhand secured excellent A grade while, OSM Shrikhand was good B grade and vendor's Shrikhand fell in fair C grade quality. The laboratory Shrikhand was possessing rich, pleasing, flavour due to more fat content followed by OSM Shrikhand and vendor Shrikhand. Moreover laboratory Shrikhand was smooth in body with uniform texture while, vendor Shrikhand BT was weak sticky with poor texture and granular body was found in OSM Shrikhand. Geetha et. atl (2003) indicated that the type of culture used has a influence on BT and acceptance. Thus, it appeared that fat and sugar content were the constituents to influence the flavour and BT score in Shrikhand. Earnest (1968) reported changes in

Table 3 : Effect of source, storage temperature, storage interval and their interactions on the Colour and appearance (CA) score of Shrikhand (out of max 10)

Storage interval (days)	Different sources Shrikhand stored at different temperatures										Days pooled means
	C_1S_1		C_1S_2		C_2S_1		C_2S_2		LS_3		
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
1	7.75	7.75	7.21	7.21	7.56	7.56	7.15	7.15	8.75	8.75	7.692
2	7.37	7.71	6.95	7.16	7.27	7.52	6.90	7.10	8.40	8.71	7.513
3	7.16	7.72	6.73	7.04	7.04	7.46	6.77	7.00	8.14	8.66	7.377
4	6.62	7.48	6.54	6.95	6.73	7.35	6.54	6.94	7.29	8.43	7.090
5	6.05	7.35	5.97	6.90	6.17	7.27	5.79	6.78	6.06	8.28	6.666
Source x Storage temperature	6.995	7.608	6.684	7.056	6.959	7.436	6.635	6.998	7.731	8.573	
Source pooled means	7.301		6.870		7.197		6.816		8.152		

Combined effect of storage temperature and storage interval on Colour and appearance score of Shrikhand

Days	1	2	3	4	5	Temperature pooled means
T_1	7.69	7.38	7.17	6.74	6.01	7.001
T_2	7.69	7.64	7.58	7.43	7.32	7.534

Attribute	Source	Storage temperature	Storage interval	Source x Storage Temp.	Source x Storage interval	Storage Temp. xStorage Interval
Results	Sig.	Sig.	Sig.	Sig.	NS	Sig.
SE (m) ±	0.060	0.038	0.060	0.085	0.134	0.085
CD at (5%)	0.166	0.105	0.166	0.371	-	0.235
CV (%)	5.83					

Table 4 : Effect of source, storage temperature, storage interval and their interactions on the Acidity and taste (AT) score of Shrikhand (out of max 10)

Storage interval (days)	Different sources Shrikhand stored at different temperatures										Days pooled means
	C_1S_1		C_1S_2		C_2S_1		C_2S_2		LS_3		
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
1	7.74	7.44	6.93	6.93	6.93	6.93	6.72	6.72	8.45	8.45	7.296
2	7.01	7.32	6.72	6.86	6.71	6.86	6.50	6.63	7.89	8.29	7.083
3	6.74	7.16	6.46	6.77	6.45	6.85	6.37	6.55	7.47	8.14	6.901
4	6.36	7.06	6.14	6.68	6.01	6.76	6.12	6.47	6.87	8.15	6.665
5	5.96	6.89	5.76	6.57	5.83	6.73	5.81	6.41	5.93	7.92	6.385
Source x Storage temperature	6.704	7.177	6.406	6.764	6.390	6.832	6.307	6.561	7.326	8.192	
Source pooled means	6.941		6.585		6.611		6.434		7.759		

Combined effect of storage temperature and storage interval on Acidity and taste (AT) score of Shrikhand

Days	1	2	3	4	5	Temperature pooled means
T_1	7.29	6.97	6.70	6.30	5.86	6.627
T_2	7.29	7.19	7.09	7.02	6.90	7.105

Attribute	Source	Storage temperature	Storage interval	Source x Storage Temp.	Source x Storage interval	Storage Temp. xStorage interval
Results	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.038	0.024	0.038	0.054	0.086	0.054
CD at (5%)	0.106	0.067	0.106	0.150	0.238	0.150
CV (%)	3.96					

Table : 4 - Effect of seed treatment with fungicides on seed germination, plumule growth, radicle growth and wilt incidence of pumpkin.

Fungicides	Doses (g/kg seed)	Percent seed germination	average length of plumule (cm)	average length of radicle (cm)	Percent wilt incidence
Bavistin T	2.5	88.00 (70.34)	5.4	9.2	5.0 (12.60)
Companion	2.5	86.00 (68.26)	5.0	8.8	7.5 (15.40)
Vitavax	2.5	81.00 (64.25)	4.8	8.0	7.5 (15.82)
Bavistin 50 WP	2.5	80.00 (63.52)	4.5	7.5	10.0 (18.33)
Thiram 75 DS	3.0	76.00 (60.75)	3.9	6.9	27.5 (31.53)
Control	--	64.00 (53.14)	3.0	5.4	60.0 (50.82)
CD (P = 0.05)		(5.68)	0.50	1.02	(5.33)

Figures in parentheses are transformed `Arc Sine' values.

Tablele2.1 : Effect of seed treatment with bio-agents on seed germination, shoot length, root length and wilt incidence of watermelon

Treatment	Doses (g/kg seed)	Percent seed germination	Shoot length (cm)	Root length (cm)	Percent wilt incidence
T. viride	6	86.00 (68.26)	5.2	8.9	20.0 (26.47)
T. harzianum	6	84.00 (66.50)	4.9	8.0	27.5 (31.53)
G. virens	6	75.00 (60.05)	4.3	7.7	35.0 (36.24)
Penicillium citrinum	4	72.00 (58.16)	4.0	7.2	42.5 (40.0)
Aspergillus niger	4	70.00 (56.82)	3.9	6.9	45.0 (42.12)
A. flavus	4	68.00 (56.63)	3.5	6.0	50.0 (45.00)
Control	--	65.00 (53.75)	3.0	5.4	60.0 (50.83)
CD (P = 0.05)		(4.90)	0.43	0.80	(4.43)

promising results were obtained with Companion or Bavistin T @ 2.5 g/kg. It was found to be significantly the best in raising the seed germination, plumule and radicle growth and in minimizing the wilt incidence. Six bio-agents viz., *Trichoderma viride, Gliocladiumvirens., T. harzianum, Aspergillus niger, Aspergillus flavus,* and *Penicillium citrinum* were assessed for their efficacy against *Fusarium* spp. The suppression of the growth of the pathogen is significantly higher with T. viride followed by *T. harzianum, Aspergillus niger*, and A. flavus. The minimum inhibition was seen with *Penicillium citrinum.*

Table : 2 - Effect of seed treatment with fungicides on seed germination, plumule growth, radicle growth and wilt incidence of muskmelon.

Fungicides	Doses (g/kg seed)	Percent seed germination	average length of plumule (cm)	average length of radicle (cm)	Percent wilt incidence
Bavistin T	2.5	89.00 (71.64)	4.7	7.6	5.0 (12.88)
Companion	2.5	88.00 (70.34)	4.6	7.4	7.5 (15.82)
Vitavax	2.5	84.00 (66.50)	4.4	7.2	10.0 (18.39)
Bavistin 50 WP	2.5	82.00 (64.91)	3.9	6.5	20.0 (26.53)
Thiram 75 DS	3.0	80.00 (63.52)	3.2	6.0	25.0 (29.98)
Control	--	66.00 (54.37)	2.8	5.8	60.0 (50.78)
CD (P = 0.05)		(6.70)	0.35	0.51	(2.60)

Figures in parentheses are transformed `Arc Sine' Values.

Table : 3- Effect of seed treatment with fungicides on seed germination, plumule growth, radicle growth and wilt incidence of bottle gourd.

Fungicides	Doses (g/kg seed)	Percent seed germination	average length of plumule (cm)	average length of radicle (cm)	Percent wilt incidence
Bavistin T	2.5	86.00 (68.26)	5.3	9.2	7.5 (15.60)
Companion	2.5	86.00 (68.12)	5.2	8.9	7.5 (15.60)
Vitavax	2.5	82.00 (65.10)	4.9	7.8	7.5 (15.89)
Bavistin 50 WP	2.5	80.00 (63.52)	4.5	7.4	10.0 (18.33)
Thiram 75 DS	3.0	79.00 (62.93)	3.9	6.9	25.0 (29.94)
Control	--	60.00 (50.78)	3.6	6.4	60.0 (50.83)
CD (P = 0.05)		(6.70)	0.35	0.82	(4.84)

Table 5 : Effect of source, storage temperature, storage interval and their interactions on the Overall acceptability score of Shrikhand (out of max 100)

Storage interval (days)	Different sources Shrikhand stored at different temperatures										Days pooled means
	C_1S_1		C_1S_2		C_2S_1		C_2S_2		LS_3		
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
1	88.35	88.35	79.89	79.89	87.98	87.98	77.91	77.91	91.75	91.75	85.182
2	82.78	84.77	75.96	76.96	84.07	85.86	73.09	75.22	85.21	89.72	81.367
3	76.54	84.44	67.31	75.52	75.55	84.57	67.40	73.80	76.98	88.79	77.094
4	66.67	83.40	60.29	74.93	67.96	83.47	59.95	72.41	68.94	87.58	72.562
5	59.80	82.21	55.51	73.18	59.47	82.25	53.49	71.46	59.11	85.73	68.226
Source x Storage temperature	74.834	84.638	67.794	76.098	75.010	84.830	66.374	74.164	76.400	88.720	
Source pooled means	79.736		71.946		79.920		70.269		82.560		

Combined effect of storage temperature and storage interval on overall acceptability score of Shrikhand

Days	1	2	3	4	5	Temperature pooled means
T_1	85.18	80.22	72.76	64.76	57.48	72.082
T_2	85.18	82.50	81.24	80.36	78.97	81.690

Attribute	Source	Storage temperature	Storage interval	Source x Storage Temp.	Source x Storage interval	Storage Temp. xStorage interval
Results	Sig	Sig.	Sig.	Sig.	NS	Sig.
SE (m) ±	0.345	0.218	0.345	0.489	0.773	0.489
CD at (5%)	0.955	0.604	0.955	1.351	-	1.351
CV (%)	3.17					

flavour during storage and these observation were in agreement with present result.

It was also observed that acceptability of Shrikhand was affected significantly by source , storage temperature and storage interval. There was significant decrease in sensory quality of Shrikhand with the increase of storage period. The initial acceptability score of 88.35, 79.89, 87.98, 77.91 and 91.75 points in C1S1, C1S2, C2S1, C2S2 and LS3 Shrikhand reduced to 59.80, 55.51, 59.47, 53.49 and 59.11 points respectively on 5th day of storage at 30 + 2°C. While, the corresponding decrease at 5 + 1°C was 82.21, 73.18, 82.25, 71.46 and 85.73 points respectively. Moreover, the score of vendor Shrikhand declined at faster rate than that of rest of Shrikhand samples. The score value in vendor Shrikhand decreased nearer to satisfactory limit of 60 points on 4th day of storage at 30 + 2°C temperature. Similarly the decrease in score was faster in all the Shrikhand samples at 30 + 2°C compared to 5 + 1°C storage with the advancement of storage period.

The OSM and laboratory Shrikhand stored at 30 + 2°C temperature exhibited dull appearance, visible growth of yeast and mould on surface, rancid flavour, dry surface area and bitter taste on 5th day of storage. Patel et. al (1993) specially pointed out that column of the product was affected by storage period, being turn to dull like yellowish towards end of storage with dull appearence. Whereas, these deterioration in sensory qualities were noticed on 4th day in vendor's Shrikhand. Therefore, on the basis of these observations it can be said that OSM Shrikhand from both the cities and laboratory Shrikhand were acceptable up to 4 days and vendor Shrikhand up to 3 days at 30 + 2°C storage.

Moreover, it was observed that the overall acceptability was differing significant between Shrikhand source when storage was continued at 5 + 1°C for 35 days. The score on 7th day was 76.71, 69.00, 77.12, 68.28 and 85.73 points for C1S1, C1S2, C2S1, C2S2 and LS3 Shrikhand respectively, indicating lower score for vendor Shrikhand followed by OSM and laboratory Shrikhand.

A definite trend in the process of deterioration of Shrikhand was noticed with the progressive period of storage at 5 + 10C for 35 days. The decrease rate in score was more in OSM Shrikhand followed by laboratory Shrikhand and lower in vendor Shrikhand. The sensory score was reduced from 7 to 14 days period in the range of 5.99 – 7.17, 3.18 and 2.44 – 2.55 points in OSM, laboratory and vendors Shrikhand respectively. The decline in score after 14 days was at somewhat constant level of 4 to 5 point per week of storage in market Shrikhand till 35 days storage. While, laboratory Shrikhand deteriorated at faster rate (8.09 points) during 14 to 21 days storage and again slow down (5.8 points) in 21 to 28 days storage. The sensory score was reduced from 7th to 35th day of storage in the range of 19.69-19.72, 13.35-15.36 and 23.19 points in OSM, vendor and laboratory Shrikhand respectively. The trend therefore did indicate that the process of deterioration at 5 + 1°C was initiated in OSM Shrikhand during 7 to 14 days storage period while, it was started in 14 to 21 days storage in laboratory Shrikhand. Prajapati et. al (1993) reported that storage life of shrikhand was 40 and 50 days at 7 and -7°C. On the other hand vendor Shrikhand had secured lower score on 7th day of storage which means the deterioration was already began during 5 to 7 days storage. The earlier deterioration in vendor Shrikhand could be co related with higher initial count of SPC and YMC.

On the basis of combined effect of Shrikhand source and storage period it was noticed that vendors Shrikhand from both the cities had shown a acceptability score of 56.76 to 59.80 points on 28th day of storage i.e. below 60 points which means, the vendor Shrikhand was in acceptable condition up to 21 days of storage at 5 ±1°C. In contrast, the reduction of sensory score below the acceptable level of 60 points in OSM and laboratory Shrikhand was observed on 35th day of storage, indicating Shrikhand was acceptable up to 28th day at 5± 1°C.

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growth, radicle growth and wilt incidence over control. The seed treatment with companion or Bavistin T @ 2.5 g/kg seed was found to be significantly the best in raising the seed germination, plumule and radicle growth and in minimizing the wilt incidence. The above results are in concurrence with the findings of Aycock (1966), Amma and Shanmugam (1974), Verma and Vyas (1977), Singh and Jain (1979), Vishwakarma and Vasu - Chaudhary (1982), Gaikwad and Sen, (1987), Adiver and Anahosur (1995), Madhu and Gupta (1995) , and Kamble *et. al.* (1999).

The result shows that all the bio-agents reduced the wilt incidence as well as improved seed germination, shoot length and root length over control. Seed treatment with *Trichoderma viride* and *T. harzianum gave* significantly better results in respect to seed germination, shoot length, root length and reduction in wilt incidence.

Seed treatment with fungitoxicants and bio-agents is found very effective to control wilt disease in test cucurbits viz. Water melon, musk melon, bottle gourd and pumpkin. In the present investigation. Above finding has close concurrence with finding of Henis *et., al.* (1978), Upadhyay and Mukhopadhyay (1983), Papavizas (1985), Mukhopadhyay (1987), Mukhopadhyay and Kaur (1990), Sawant and Mukhopadhyay (1990), Vyas (1994), Sharma and Mishra (1995), Dubey *et., al.* (1996), Dubey (1997), Kumar and Dubey (2001) and Dubey (2002).

CONCLUSION

In order to control wilt disease of cucurbits tests watermelon, muskmelon, bottle gourd and pumpkin, different fungicides, and bio-agents, Though none of the fungicides completely could control the diseases, yet

Table : 1 - Effect of seed treatment with fungicides on seed germination, plumule growth, radicle growth and wilt incidence of watermelon.

Fungicides	Doses (g/kg seed)	Percent seed germination	average length of plumule (cm)	average length of radicle (cm)	Percent wilt incidence
Bavistin T	2.5	90.00 (72.00)	5.4	9.2	5.0 (12.78)
Companion	2.5	85.00 (67.35)	5.2	8.9	5.0 (12.60)
Vitavax	2.5	83.00 (65.69)	4.8	7.8	7.5 (15.82)
Bavistin 50 WP	2.5	80.00 (63.52)	4.5	7.2	10.0 (18.40)
Thiram 75 DS	3.0	78.00 (62.21)	4.0	6.9	25.0 (32.92)
Control	--	68.00 (55.60)	3.5	5.9	60.0 (50.83)
CD (P = 0.05)		(5.35)	(0.25)	0.38	(6.23)

pathogen s including soil-borne fungi in nature. Among soil fungi in cultivated soil all over the world, *Fusarium* spp. caused vascular wilt in water melon,muskmelon,bottle gourd and pumpkin. It includes a large diversity of strains (i) all of them are saprophytic (ii) many of them are parasitic i.e.able to invade in some extent plant tissues without inducing symptoms and (III)some of them are pathogenic i.e. Induce either root rot or tracheomycosis(Sharma,2006). The effect of seed treatment with fungitoxicants and bio-agents was tasted on seed germination, shoot length and root length as well as wilt incidence in test cucurbits.

MATERIALS AND METHODS

Five fungicides viz., Bavistin T, Companion, Vitavax, Bavistin 50 WP and Thiram 75 DS have been found effective in laboratory bioassay which were further tested as seed dresser for their efficacy on seed germination, plumule growth and radicle growth in pots under glasshouse condition. The seeds of cucurbits were treated with fungicides in their recommended doses before 48 hours of sowing in such a way so that the entire surface of seed is covered with test fungicides. The treated and untreated seeds were sown in pots filled with soil from sick pot @ 5 seed per pot. The experiment was conducted in completely randomised design with four replications. The observations on the seed germination, plumule and radicle growth were taken after 10 days and 25 days of sowing respectively during each year as well as on wilt incidence at seedling and adult stage. The result obtained are presented in table 1.1, 1.2, 1.3 and 1.4.

In order to see the effect of seed treatment with bio-agents on seed germination, shoot length, root length and wilt incidence, the seeds were treated with spores and mycelial suspension of the bio-agents the test bio-agents. The test bioagents obtained from the liquid broth and mixed with 1.0% carboxy methyl cellulose and coated to the seeds. The seeds were sown in pots and data recorded on seed germination after 2 weeks and 4 weeks as well as wilt incidence was observed at 10 weeks after sowing. The data are presented in tables 2.1, 2.2, 2.3 and 2.4.

RESULTS AND DISCUSSION

The result in table 1.1, 1.2, 1.3, 1.4 indicated that all the fungicides are significantly effective to improve seed germination, plumule growth, radicle growth and to reduce wilt incidence over control. The seed treatment with companion or Bavistin T @ 2.5 g/kg seed was found to be significantly best in raising the seed germination, plumule and radicle growth and in minimizing the wilt incidence.

Five fungicides viz.,Bavistin T, Companion, Vitavax, Bavistin 50 WP and Thiram 75 DS have been found effective in laboratory bioassay which were further tested as seed dresser for their efficacy on seed germination, plumule growth and radicle growth in pots under glasshouse condition. All the fungicides are significantly effective in giving the improved seed germination, plumule

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CONCENTRATION OF HEAVY METALS IN VEGETABLES GROWN IN SEWAGE IRRIGATED SOILS, ALLAHABAD

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ABSTRACT

Vegetables sold in the Allahabad market are likely to absorb toxic heavy metals in edible part of plants till they reach the human being. The samples were purchased by farmer randomly from three major areas in Allahabad, namely Naini, Kulbhaskar and Baxibandh sewage irrigated sites. The levels of three selected toxic heavy metals; Lead, Cadmium and Chromium were determined in 9 vegetables samples of which 3 are leafy vegetables, 3 are over-ground vegetables and 3 underground grown vegetables. Overall, the levels of heavy metals ranged to 4.42- 14.12 mgkg-1 for Pb, 0.18 to 2.38 mgkg-1 for Cd, non-detectable to 2.68 mgkg-1 for Cr in dry weight samples. In all samples the leafy vegetables contained considerably higher levels for all metals as compared to underground vegetables and least in overground vegetables.

Keywords: *Heavy metals, sewage sludge sites, accumulation, vegetables*

Use of wastewater for irrigation of agriculture lands is one of common practice in suburban and industrial areas in many parts of the world (Sharma,2007, Gupta,2008).Sewage waste has been implicated as a potential source of heavy metals such as Copper (Cu), Cadmium (Cd) Zinc (Zn), Lead (Pb), Nickel (Ni) and Iron (Fe) in the edible and non-edible parts of vegetables (Sharma, Agrawal and Marshal 2006). Waste water carries appreciable amounts of trace toxic heavy metals (Pescod, 1992, Yadav,2012), which often leads degradation of soil health and contamination of food chain mainly through the vegetables grown on such soils (Rattan, 2002).The toxic elements accumulated in organic matter in soils are taken up by growing plants and lastly exposing humans to this contaminations (Khan et al.2008). Heavy metals present in edible parts of vegetables may be taken up by the crop root and incorporated into the edible parts of plant tissues. Heavy metals deposited on the surface can often be eliminated simply by washing prior to consumption, whereas bio-accumulated metals are difficult to remove and are of major

concern.

The aim of this study is, therefore, restricted to evaluate the potential health hazards due to the consumptions of various selected vegetable by analyzing the levels of toxic heavy metals.

MATERIALS AND METHODS

The study was carried out by random sampling from different locations in Allahabad namely Naini, Kulbhaskar and Baxibandh sewage irrigated sites. Where applicable, sampling of each type of vegetable was carried out in three different places in each of the areas listed above and according to their seasonal availability. The vegetable samples were grouped into three main categories; leafy, underground and over ground vegetables. The selected samples represent vegetables that are commonly used in Allahabad diet. A total number of 9 samples were collected, of which 3 are leafy, 3 underground and same number of over ground vegetables. The leafy vegetables are comprised of spinach, lettuce and fenugreek, the underground vegetables are comprised carrot, radish and turnip; while the over ground vegetables are comprised to tomato, eggplant and green pepper.

Once collected, samples were first washed as fresh vegetables using normal tap water. All washed samples were carefully air dried, cut into small pieces and weighed immediately (fresh weight, Wt) before drying in the oven at 600C for 24 hours. When samples became fully dry they were weighed again (dry weight Wd) so as to determine the original water content in each sample. This was followed by grinding and homogenization of the dried samples into fine powder using an electric grinder. The powdered samples are then stored in closed containers in absence of humidity. One gram of ground plant material was taken in 100 ml beaker and 10 ml of tri –acid mixture (HNO3,conc. H2 SO4 and HClO4 in 5:1:1 ratio) was added. The content was heated on hot plate at low heat (800 C) for 30 minutes and the volume was reduced to about 5 ml, until a transparent solution was obtained (Allen, et al., 1986). After cooling, 20 ml distilled water was added to the beaker and the content was filtered through Whatman number 42 in to a 100 ml volumetric flask and the volume was made up with distilled water. The extract was analyzed directly with the help of Atomic Absorption Spectrophotometer Perkin Elemar Model ANALYST-100 at National Botanical Research Institute (NBRI), Lucknow. (Li et.al., 1995)

RESULTS AND DISCUSSION

In the study, the concentrations of Pb, Cd, Cr and Zn have been observed in the selected vegetables and the results have been presented in table 1 and figures 1 to 3 . The more elevated concentration was found in spinach and lettuce, all of which fall in the category of leafy vegetables. The results have been presented in term of mg kg-1 of dry sample

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EFFECT OF FUNGITOXICANTS AND BIO-AGENTS ON *FUSARIUM* SPP. CAUSING WILT DISEASE IN CUCURBITS

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ABSTRACT

Twelve fungicides, viz. Bavistin 50 WP ,Topsin-M 70WP,Thiram75DS, Score 25EC,Vitavax, Cuman L, Mancozeb, Antracol , Sulfex and Blitox-50 WP as well as two combination of Fungicides viz.Companian (Carbendazim 12% +Mancozeb 63%) and Bavistin T (Carbendazim+Thiram in the ratio of 1:2) were assessed for their efficacy against *Fusarium* spp. causing wilt disease in watermelon, muskmelon, bottle gourd and pumpkin through laboratory bioassay using "Poison Food Technique". Among test fungitoxicants, Bavistin 50WP@0.2% ,companion(carbendazim +Mancozeb) @0.1%, and Bavistin T @0.1% provided cent per cent control of *Fusarium oxysporum* f.sp. niveum (watermelon wilt), *F. oxysporum* f.sp. melonis (muskmelon wilt), *F. oxysporum* f.sp. lagenariae (Bottle gorurd wilt) and *F.solani* f.sp. cucurbitae (pumpkin wilt), respectively. The remaining fungicides, although inhibit the growth of causal fungi to varying degrees, but fail to inhibit completely . They are considered to be partially effective fungitoxicants. Among the partially effective fungicides, Topsin-M, Vitavax, Thiram,Score, and Cuman L gave high inhibition response which found significantly inferior to Carbendazim alone or its combination with Mancozeb and Thiram. The least effective fungitoxicant was Blitox-50@0.3 per cent concentration.

Six bio-agents, viz. *Trichoderma viride, T.harzianum, Gliocladium virens, Aspergillus niger, A. flavus* and *Penicillium citrinum* were also assessed for their efficacy against Fusarium spp by using "Dual culture technique" . all the test bio-agents suppressed the growth of the causal fungi. The suppression of growth of the pathogens is significantly higher with *T. viride, T.harzianum, A . niger and A. flavus* which were at par among themselves. The minimum inhibition was seem with *Penicilium citrinum.s*

Key Wrods : *Fung itoxicants, bio-agents, Fusarium spp. cucurbirts*

Cucurbits are mainly warm season crops which grown in tropical and sub-tropical regions.They are attacked by a wide range of

indigenous medicinal plants.

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Table.1 Summary of Lead, Cadmium and Chromium content mean (mg kg-1) determined in selected vegetable samples.

Sample	Number of Sample	Lead	Cadmium	Chromium
Spinach	3	12.82-14.12 (13.39)	2.14-2.38 (2.25)	2.48-2.68 (2.56)
Lettuce	3	11.52-12.24 (11.81)	2.02-2.12 (2.07)	2.12-2.24 (2.17)
Fenugreek	3	9.20-10.32 (9.66)	1.68-1.84 (1.74)	2.0-2.10 (2.06)
Radish	3	7.68-8.20 (7.92)	1.52-1.62 (1.56)	1.52-1.68 (1.58)
Carrot	3	5.80-6.24 (6.0)	1.42-1.58 (1.48)	1.40-1.54 (1.46)
Turnip	3	6.24-7.36 (6.63)	1.40-1.56 (1.46)	1.33-1.52 (1.43)
Tomato	3	3.80-4.82 (4.16)	0.58-0.64 (0.60)	0.16-0.20 (0.18)
Green pepper	3	3.66-4.62 (4.08)	0.18-0.24 (0.20)	n.d
Eggplant	3	3.54-4.42 (3.94)	0.12-0.18 (0.15)	n.d

Lead

In the analyzed samples, lead concentration ranged from 3.54 to 14.12 mgkg-1, as shown in table 1and figure 1. The lead concentration in leafy vegetable was much higher than other types of vegetable which are coherent with the literature.Similar results were reported by many researchers as like Pb level was found in China (0.18-7.75 mgkg-1) (Liu et al 2006), (1.97-3.81 mgkg-1) (Liu et al.2005) and in Varanasi, in India (3.09-15.74 mgkg-1) (Sharma et al 2007). The concentration of heavy metal found maximum in Kulbhaskar sewage sites then Naini sewage sites and least in Baxibandh sewage sites. The Lead tolerance level has been reported by Kachenko and Singh and Cabrera 1994 to be 0.01 mgkg-1.

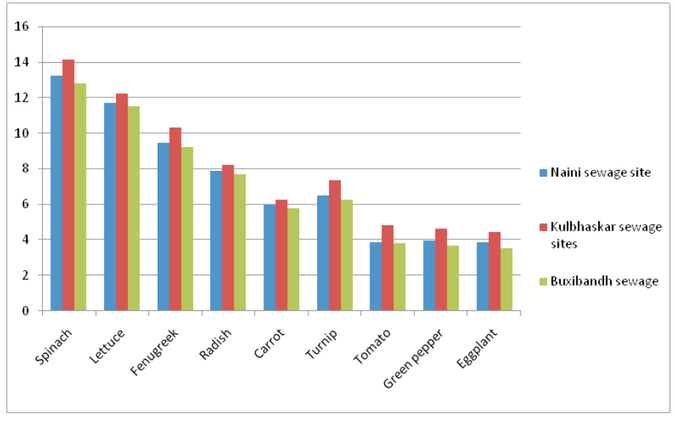

Figure 1: Pb concentration found in samples from different areas. Concentration is expressed in mgkg-1 based on dry weight analyzed for each sample type.

Cadmium

The cadmium concentration in all samples varied from 0.12 to 2.38 mgkg-1 (table 1) and Cd concentration in all vegetable and all sites shown in figure 2. Same Cd concentration reported by many researchers as like (Liu et al.2005) in China (0.03-0.73 mgkg-1) and Egypt (0.002-0.08 mgkg-1) (Doghien et al.2004), whereas it is very closed which the findings of Sharma et al.(2007) (0.5-4.36 mgkg-1) in vegetables from Varanasi, India. The higher concentration were found in leafy vegetables such as spinach and lettuce then in underground vegetable as like radish and least found in overground vegetables in Kulbhaskar sewage sites. The cadmium tolerance level has been reported by Kachenko and Singh 2004 and Cabrera 1994 to be 0.01 mgkg-1 on fresh weight and 57-71 µg/day respectively.

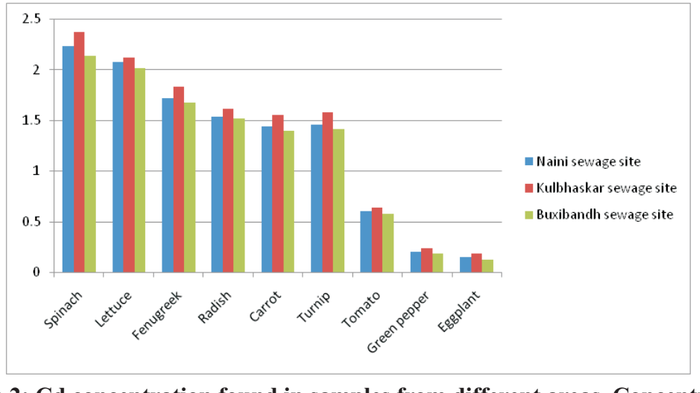

Figure 2: Cd concentration found in samples from different areas. Concentration is expressed in mgkg-1 based on dry weight analyzed for each sample type.

54.	*Tribulus terrestris* (L.)	Chota Gokhru	Fabaceae	Roots	Kidney Stones and Urinary infections
55.	*Trigonella foenum - graecum* (L).	Methi	Zygophyllaceae	Seeds	Diabetes and Cardiac problems, Increase secretion of milk in feeding mother
56.	*Withania sominifera* (L.)	Ashwagandha	Solanaceae	Leaves and Roots	Arthritis, Asthma, Cold & Cough, Conjunctivitis, Diabetes, Diuretic, Epilepsy, Insomnia, Intestinal infections, Leprosy, Nervous disorders, Ulcer .
57.	*Zingiber officinale* Roscoe .	Adarak	Zingiberaceae	Rhizome	Asthma, Cold, Cough, Diarrhoea, Ear infection, Fevers, Joint pain, Menstrual pain, Migraine, Rheumatism, Sore throat

During the survey of different localities of Jaunpur city, a number of medicinal plants were observed at different places. Table -1 shows fifty seven plants used most frequently and traditionally for the treatment of specific human diseases in Jaunpur district, U.P.. The medicinal value of these plants were recorded with help of local Vaidyas or Hakims . It was observed that even though the accessibility of allopathic medicine for simple and complicated diseases was available but most of the people of the area relied on medicinal plants, at least for the treatment of simple diseases like cold, cough, fever, gastro-intestinal disorders, headache, skin diseases and tooth infections etc.

The conservation with optimum care is needed about following plants, i.e. Adhatoda vasica, Aloe vera, Aspargus racemosus , Azadirachta indica., Bacopa monnieri, Boerhaavia diffusa, Convolvulus microphyllus , Eclipta prostrata, Phyllanthus niruri, Rauvolfia serpentina, Sphaeranthus indicus , Terminalia arjuna, Tinospora cordifolia, Tribulus terrestris, Withania sominifera ,etc. which are exploited maximum for primary health care as herbal medicines and may be extinct in near future.

The aim of this study is not only to prescribe the remedies for different diseases in human-beings but also an endeavor to draw attention for the need of a detailed study on medicinal plants which can provide better and efficient remedies in future for the fatal diseases like cancer, hepatitis and cardio-vascular diseases etc. Medicinal plants provide huge opportunities for community development, livelihood improvement and poverty alleviation. The conservation efforts are needed by plantation and protection of these plants with maximum participation of local people.

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43.	*Ocimum sanctum* (L.)	Tulsi	Lamiaceae	Leaves	Asthma, Arthritis, Bronchitis, Cardio protective, Chronic fever, Diarrhoea, Dysentery, Hepatoprotective, Malaria, Painful eye diseases, Pimples, Skin diseases
44.	*Phyllanthus emblica* (L.)	Amala	Euphorbiaceae	Fruits	Cough and Cold, Stomach disorder, Piles, diuretic, rich source of vitamin- C
45.	*Phyllanthus niruri* (L.)	Bhumiawala	Euphorbiaceae	Leaves	Asthma , Bronchitis and Jaundice
46.	*Rauvolfia serpentina* Benth. Ex. Kurz	Serpgandha	Apocynaceae	Roots	Blood Pressure, Snake bites and in madness
47.	*Ricinus communis* (L.)	Rendi	Euphorbiaceae	Seeds	Hydrocele, Itchiness, Leprosy, Nerve pain, Pain, Purgative and in Toothache
48.	*Sphaeranthus indicus* (L.)	Mundi Booti	Asteraceae	Flower	Epilepsy, Mental illness, Jaundice, Diabetes, Leprosy, Fever, Cough, Hemorrhoids, Helminthiasis, Dyspepsia and Skin diseases
49.	*Solanum nigrum* (L.)	Makoy	Solanaceae	Whole Plant	Jaundice, in Enlargement of liver and Spleen
50.	*Syzygium cumini* Skeels.	Jamun	Myritaceae	Seeds and Fruits	Diabetes, Dyspesia and Gas trouble
51.	*Tamarindus indica* (L.)	Imli	Caesalpiniaceae	Fruit, Bark	Burns, Cough, Digestive disorders, Dysentery, Fever, Jaundice, Malaria, Piles, Scurvy, Sore Throats, Ulcers
52.	*Terminalia arjuna* Roxb.	Arjun	Combretaceae	Stem bark	Angina, Anti-inflammatory, Asthma, Dysentery, Ear-ache, Heart failure, Hypertension, Hypercholesterolemia
53.	*Tinospora cordifolia*, Miers.	Amrita/Geloy /Guruch	Menispermaceae	Roots	Diabetes, Digestive problems, Fever, Gout, Liver disorders, Malaria, Menorrhagia , Pitta, Syphilis, Urinary tract infections, Vomiting , Stress, Body weakness.

Chromium

The concentration of Chromium observed for all vegetables have been given in table-1 and shown in figure-3. In leafy vegetables Cr concentration varied from 2.00 to 2.68 mgkg-1 and in non-leafy vegetables Cr concentration varied from non-detectable to 2.10 mgkg-1 of dry sample which are coherent with various published studies. The higher concentrations were found in leafy vegetables then underground vegetables and least in overground vegetables in maximum in Kulbhaskar sewage sites and lower bio-concentration was found in Buxibandh sewage sites.

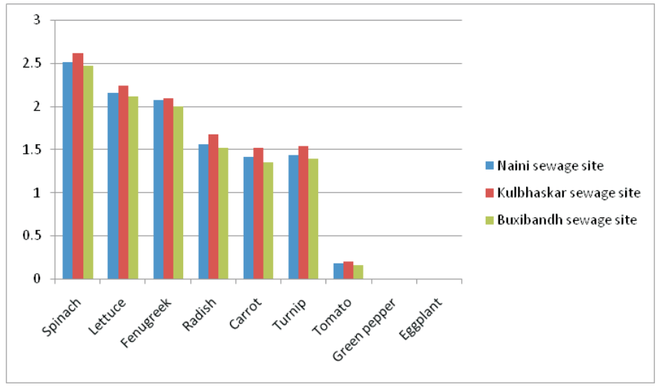

Figure 3: Cr concentration found in samples from different areas. Concentration is expressed in mgkg-1 based on dry weight analyzed for each sample type.

The normal dietary of Cr in adults from 13 to 61 µg/day of total intake by ingestion, depending on age, country and gender as has been reported by Mann and Truswell (1998). This range clearly excludes the intake from water and air where the sum of dietary, air and water intake should not exceed 200 µg/day as set by the National Research Council. However, the study shows that the risk increases in consuming leafy vegetables such as spinach, lettuce and radish where high concentration of Cr has been detected (figure 3).

CONCLUSION

The concentrations of Pb, Cd and Cr were determined and the results show that the leafy vegetables in particular contain higher levels of all metal studied. The concentration of heavy metals were evaluated maximum in leafy vegetable than in order underground and least in overground vegetables. Since the sources of heavy metal contamination of sample were difficult to determine, the study therefore, was centered on assessing the levels of vegetable samples only, while excluding other sources such as water and air.

In general, the results obtained show that the children are at higher risk from heavy metals particularly Pb, Cd and Cr than adults. In these studies Kulbhaskar sewage sites was found highly polluted site, second Naini sewage irrigated site and least Buxibandh sewage site.

Since there is a need to discuss levels of selected heavy metals in individual samples of vegetables various locations in Allahabad, the

results obtained in present study encourage for further and future detailed study.

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30.	*Euphorbia hirta* (L.)	Bari duddhi	Euphorbiaceae	Whole Plant	Asthma, Boils, Bronchitis, Cough, Diarrhoea, Dengue, Digestive problems, Dysentery, Fever, Gonorrhea, Jaundice, Snakebite, Tumors, Wounds
31.	*Euphorbia thymifolia* (L.)	Chhoti duddhi	Euphorbiaceae	Whole Plant	Leucorrhoea, Spermotorrhoea
32.	*Ficus bengalensis* (Linn).	Bargad	Moraceae	Bark, seed, latex	Cholera, Dysentery, Fever, Gonorrhoea, Inflammations of liver, Leprosy, Mouth sores, Piles, Skin diseases, Syphilis, Vaginal complains, Vomiting, Ulcers
33..	*Ficus religiosa* (Linn.)	Pipal	Moraceae	Bark, leaves, Shoots, Fruit, Seeds and Latex	Amnesia ,Diabetes, Wound healing , Rheumatic pains and Arthritis
34.	*Foeniculum vulgare* Mill.	Saunf	Umbelliferae	Seed	Gastrointestinal disorder, Cramps, Gout, Gum infection, Dysmenorrhoea, Digestion, Increase milk secretion in feeding mother.
35.	*Lagenaria siceraria* standl.	Lauki	Cucurbitaceae	Leaves and Fruits	Leaves are used in Jaundice, fruit juice is used in Diabetes and Cardiac Diseases
36.	*Lawsonia inermis* (L.)	Mehandi	Lytheraceae	Leaves	Burning sensation, Graying of Hair, Hair fall, Edema, Headache, Hepatitis, Leprosy, Pain, Skin diseases
37.	*Launea aspelenifolia* (Wild.)Hk. F.	Ban Gobhi	Asteraceae	Arial parts	Leucoderma, Piles
38.	*Leucas aspera* (L.)	Goma	Lamiaceae	Flower	Cough , Cold, Fever and Skin diseases
39.	*Madhuca indica* Gmel.	Mahua	Sapotaceae	Bark, Leaves, Fruits, Flower and Seeds	Bleeding Gum and Ulcers, Diabetes, Cough, Burn and Skin diseases
40.	*Mangifera indica* (Linn.)	Aam	Anacardiaceae	Fruit, seed, root, leaves	Colic, Diarrhoea, Dysentery, Gastro protective, Liver disorders
41.	*Momordica Charantia* (L.)	Karela	Cucurbitaceae	Fruits	Diabetes, Rheumatism, Gout, disease of Liver and Spleen.
42.	*Moringa oliefera* Lam.	Sahjan	Moringaceae	Leaves. Stem Bark, Flower and Fruits	In Night Blindness, Kidney Stones and Urinary infections, control of Cholestrol.

17.	*Carica papaya* (Linn).	Papita	Caricaceae	Fruit, seed	Abdominal disorders, Diarrhoea, Dysentery, Dyspepsia, High Blood pressure, Hyperacidity, Malaria, Strokes, Wounds
18.	*Cassia tora* (L.)	Chakwar	Fabaceae	Leaves and Seeds	Eczema, Itching and Ringworm
19.	*Catharanthus roseus* (Linn.)	Sadabahar	Apocynaceae	Leaves & flowers	Leaf and flower juice are used in Diabetes
20..	*Chenopodium album* (L.)	Bathua	Chenopodiaceae	Leaves and Stem	Anaemia, Constipation, Indigestion, Piles, Disorders of Liver and Spleen
21.	*Cissus quadrangularis* (Linn.)	Harjor	Vitaceae	Stem	Used to heal Bone fractures and in Rheumatism.
22.	*Citrus limon* (L.)	Nimbu	Rutaceae	Fruits	Stomach disorders, reduce body weight
23.	*Cleome viscose* (Linn.)	Hurhur	Cappradiaceae	Leaves	Relieve inflammation of Ear and prevent formation of pus.
24.	*Convolvulus microphyllus* Sieb,ex, spreng.	Shankhpushpi	Convolvulaceae	Whole Plant	Brain tonic, High Blood Pressure, loss of memory
25.	*Curcuma longa* (L.)	Haldi	Zingiberaceae	Rhizome	Abdominal pains, Anemia, Blood purifying, Cold, Cough, Diabetes, Eczema, Digestive problems, High cholesterol, Jaundice, Menstrual disorders,Swelling, Throat problems, Wounds
26.	*Cuscuta reflexa* Roxb.	Amarbel	Convolvulaceae	Whole Plant	Cardio tonic, Diuretic, Fever, Hair growth activity, Leprosy, Muscle relaxant, as dressing in cuts, and Rheumatism.
27.	*Datura metal* (Linn.)	Dhatura	Solanaceae	Leaves and Fruits	Leaves are used to reduce pain and swelling, roasted pulp of fruit is applied on “Sehmuna (White spots)”
28.	*Digera muricata* (L.)	Lahsua	Amaranthaceae	Leaves and Stem	Anaemia , Jaundice
29.	*Eclipta prostrata* (L.)	Bhringraj	Asteraceae	Leaves, Stem, Flower and Seed	Anaemia, Cough, Enlargement of liver and spleen, Jaundice, Leucoderma

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COOKING QUALITY OF DIFFERENT VARIETIES OF PADDY (ORYZA SATIVA L.)

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ABSTRACT

The Eight varieties/Genotype of paddy were selected for this study varieties namely Ashwani, Kranti, Mansoori, Pant-12, CSR-l0, CSR-13, NDR-359, BIS(PBY). The investigation was carried out to determine and compare the physical thermal, chemical and eating/organoleptic qualities of different varieties of paddy. Each analysed for various physical (Test weight head rice recovery, hulling percent, milling percent, chalkiness grain dimension and seed grade). thermal (water uptake, kernels elongation, kernel elongation ratio, volume expansion ratio), chemical (protein total amylose, soluble, amylose, insoluble amylose contents) and organoleptic/eating quality characteristics. All varities of rice are widely summarized with physical, thermal, chemical and organoleptic eating quality characteristics. Amongst all varieties BIS (PBY) gives the best response on the basis of overall organoleptic score and kranti appeared to be most superior in the protein content, NDR-359 was found to be best on the basis of total amylose content. In UP. Paddy grown vareties kranti appeared to be most superior in protien content and on the basis of high kernel elongation ratio Mansoori gives the best responce. Variety NDR-359 was found to be the best considering total amylose content volume expansive ratio variety BIS (PBY) were found to be superior on the basis of overall organoleptive score awarded by the taste panel. Variety NDR-359 appeared to be the best considering total amylose content and volume expansion ratio. Amongst all variety kranti on the basis of high protein content, was judged superior variety, followed by Mansoori and CSR-13. Mansoori was also found to be the best variety in higher kernel elongation ratio point of view. So all above mentioned varieties may be suggested to house wives for kitchen purposes on the basis of their quality characteristics.

Key words: *Quality, character of paddy, variety.*

There is no more important crop in the world today than rice as it is the staple food for more than 70 percent population of the world, especially of South East Asians, whose population is increasing rapidly Therefore, its production always holds a key role in the overall food situation of the world. There are 111 rice growing countries in the world which include all Asian countries, especially some African countries, most of the South and Central American Countries, Australia and atleast four states in the United States. India has the worlds largest growing area followed by China and the two countries produce more than half (57 percent) of the worlds crop (IRRI, 1993).

The world per capita consumption of rice has increased over the years, from 53.1 Kg

in 1978 to 56.4 kg in the year 1988 which is further like to increase to 58.6 kg/year the year 2000. (Begurn and Bhattacharya 2000)

In India, rice is grown in almost all the states, highest area being in West Bengal, followed by Andhra Pradesh and Bihar. In terms of productivity, highest is Punjab followed by Tamil Nadu and Haryana.

The protein efficiency ration (PER) of 1.93 for parboiled milled rice compared with 1 74 for raw milled rice suggests that the quality of protein seemed not degraded. The parboiled rice bran contains more oil than raw rice bran. The oil content of brown rice ranges from 2 to 4 percent with high concentration in the outer layers, of which 50 to 70 percent is removed during milling. Protein is the second constituent of brown rice, following starch. Increasing the percent of protein is considered important in providing a better staple food for rice eaters. (Bajpai et al., 1989). Rice starch is digested so quickly than any other high starchy food, this aspect makes it distinctive among other cereals. The cooking and eating value is determined by the anylase content and gelatinization temp. (Asghar 2012)

The nutritive value of protein depends upon its amino acid content. The main protein in rice is arginine. Rice proteins are rich in arginine but like other cereals poor in lysine and threonins.

The present investigation cooking quality of different vanities of Paddy was undertaken.

MATERIALS AND METHODS

8 varieties / Genotype of paddy were procured from the processing plant of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur on the basis of varieties / genotype, our samples consisted in following: Ashwani, Kranti, Mansoori, Pant – 12, CSR-1O, CSR-13, NDR-359 and BIS (PBY).

All the samples of rice was purchased from the processing plant of Chandra Shekhar Azad University of Agriculture & Technical, Kanpur brought to the laboratory, packed in jute bags transferred in plastic containers and stored at room temperature, samples were analysed for following physical, thermal, chemical and organoleptic characteristics.

PHYSICAL CHARACTERISTICS

(a) Hulling percentage (b) milling percentage (c) moisture content (%) (d) test weight (1000 kernel weight, g) (e) head rice recovery (%) (f) Chalkness (% w/w) (g) Paddy length, breadth and length/breadth ratio (h) kernel length, breadth and and length/breadth ratio (i) Seed grade).

Thermal Characteristics :

(a) Water uptake (ml/100g) (b) Kernel elongation and (c) kernel elongation ratio (d) volume expansion ratio

Chemical characteristics :

(a) crude protein content (%) (b) Total amylase content (%) (c) Soluble amylase (%) (Starch iodine blue value) (d) Insoluble amylase content (%)

Organoleptic / Eating quality :

(a) Appearance (b) Aroma (c) Cohesiveness (c) Tenderness (d) Taste Results and discussion:

RESULTS AND DISCUSSION

Salient findings emerging out of the present investigation are summarized below Under physical characteristics, hulled rice recovery was found significantly superior in Ashwani (80.1%). The lowest value recorded by variety BIS(PBY) (69.3%). In milling percent results, the highest value exhibited by variety Ashwani (74.4%) and lowest value showed by variety BIS(PBY) (64.4%).

5.	*Aegle marmelos* (L.)	Bel	Rutaceae	Fruits	Cholera, Colic, Cooling, Diabetes, Diarrhoea, Digestive problems, Dysentery, Fever, Heart tonic, Jaundice, Nutritive, Respiratory disorders
6.	*Allium sativum* (L.)	Lahasun	Liliaceae	Bulb	Nervous, and Bronchial disorder, Diabetes & Cardiac problems
7.	*Aloe vera* (L.)	Ghritkumari	Liliaceae	Leaves	Used as laxative , in treatment of Liver, Spleen, Cardiac problems, Piles, Eye troubles, minimizes Diabetic complications, Dermatitis and other Skin diseases
8.	*Amaranthus spinosus* (L.)	Katili Chaulai	Amaranthaceae	Roots	Menorrhagia, Gonorrhoea, eczema and inflammatory swellings.
9.	*Argemone mexicana* (Linn.)	Bharbharwa	Papaveraceae	Seed & Latex	Seed paste in Scabies & Latex applied in Conjunctivitis
10.	*Aspargus racemosus* (Wild.)	Satawar	Liliaceae	Roots	Epilepsy, Hysteria, Leucorrhoea, Rickets, increase lactation in woman
11.	*Asphodelus tenuifolius* (cav.)	Banpiyazi	Liliaceae	Seeds	Seeds are orally given in urinary troubles.
12.	*Azadirachta indica* (Juss.)	Neem	Meliaceae	Leaves, twigs, Barks & Seeds	Blood purifier, used as antiseptic in many skin infections, measles, small pox and boils, Leaves used orally in Diabeties
13.	*Bacopa monnieri* (L.)	Choti Brahmi	Scrophulariaceae	Entire Plant	Nerve Tonic, Asthma & Snake Bite
14.	*Beta vulgaris* (L.)	Chukandar	Chenopodiaceae	Roots	Anaemia ,Menstrual Cycle Regulation
15.	*Boerhaavia diffusa* (Linn.)	Gadhapurna	Nyctaginaceae	Roots	Jaundice , Anaemia Diuretic, lower blood sugar in diabetics.
16.	*Calotropis procera* R.Br.	Madar	Asclepidiaceae	Leaves, latex& flowers	Leaves are used in sore skin diseases & Rheumatic joints, Latex is applied in Toothache ,Ring worm, Leprosy, Flowers are used in Cough , Cold and Asthma

local communities are store house of informations (Dixit et. al., 2010).

Jaunpur district is situated in eastern Uttar Pradesh between 25°. 24°; 26°, 12°; North South to 82°.7°; 84°.5° East West covering area of 4,038 Km2.This district is located to the northwest of Varanasi. The aim of such kind of study was to develop awareness of the people about the importance of these plants and to preserve this traditional system of knowledge by proper documentation because records of traditional knowledge may lead to the authenticity.

MATERIALS AND METHODS

The survey of medicinal plants were carried out around Jaunpur city. The field survey were done with the help of local "Vaidays" or " Hakims" and local inhabitants with elderly aged people in order to identify plant species of medicinal importance. The plants were botanically identified with help of floras (Duthie, 1960 ; Srivastava, 1976).

RESULTS AND DISCUSSION

Some medicinal plants were listed alphabetically with their Botanical name, local name, family and parts of plant for medicinal uses in diseases.

Table-1 Medicinal Plants and their uses

S.N.	Botanical Name	Local Name	Family	Parts of Plant for Medcinal Use	Ailments
1.	*Abutilon indicum* (L.)	Kanghi	Malvaceae	Seeds, Root, Leaves, Bark	Bronchitis, Cold, Cough, Diuretic, Dysentery, Fever, Leprosy, Piles, Tooth pain, Ulcers
2.	*Acacia nilotica* (L.)	Babul	Mimosaceae	Leaves, twigs, Barks & Seeds	Jaundice , Diabetes, Diarrhoea, Pulmonary & Bronchial Diseases
3.	*Achyranthus aspera* (Linn.)	Latjira/ Chirchiri	Amaranthaceae	Roots	Abdominal pains, Blood diseases, Bronchitis, Vomiting, Cough, Dysentery, Dyspepsia, heart Disease, Leprosy, Mouth sores, Toothache, Antidote for Scorpion sting and poisonous insect bite.
4.	*Adhatoda vasica* Nees.	Arusa	Acanthaceae	Leaves & Roots	Bronchitis, Asthama & Cough

Moisture content varied significantly in all varieties except kranti and NDR-359. In the results the higher moisture content exhibited by Mansoori (12.8%) and lowers percentage showed by Kranti (10.1%). Test weight also varied widely in all eight varieties. Variety BIS (PBY) (20.40 gm) recorded high test weight and NDR-359 shows low test weight (14.50 gm) but the mean values of all varieties for test weight were found to be statistically non- significants.

Head rice recovery percentage varied widely and significantly ranging from 65.1% to 75.1%.

Variety kranti (28.1%) showed highest chalkiness percent and variety Mansoori (8.7%) recorded lowest chalkiness percentage.

As regards grain dimensions and seed grade all varieties varied significantly in respect of length, breadth and length - breadth ratio. Long slender rice varieties exhibited relatively higher length - breadth ratios (mean value 4.5) than short bold varieties.

Water uptake volume was highest for variety CSR-10 (222.4 mlIlOO gm) whereas lowest for BIS(PBY) (75.1 mlJlOOgm).

Kernel elongation ratio were highest for variety Mansoori (1.91) and volume expansion ratio, highly showed by variety NDR-359 (5.44). Lower value for Kernel elongation ratio exhibited by long bold rice varieities.

Protein content varied widely from 9.41 % to 11.23%, Higher and lower values showed by variety Kranti and NDR-359, respectively.

Variety NDR-359 recorded highest total amylose content i.e. 34.54%.

Insoluble amylose content varied widely with in all eight varieties of rice - ranging from 20.04% to 31.97%. Variety NDR-359 gave highest insoluble amylose percent i.e. 31.97%.

As regards soluble amylose content wide variations was observed with in all eight rice varities. The lower value for soluble amylose content was recorded by variety Mansoori (1.17%) and higher value exhibited by CSR-13(4.19%). All results of soluble amylose content showed statistically significant response.

Organoleptic score for eating quality characteristics also varied widely. The higher score for appreance (mean value 4.6), aroma (mean value 4.8), cohesiveness (meanvalue 4.1), tenderness (mean value 3.6) and taste(mean value 4.2) and over all higher organeleptic score (mean value 4.1) was exhibited by variety BIS (PBY). The lowest organaleptic score (overall) showed by variety Kranti (2.6).

On the basis of the results summarized above the following conclusion could be drawn:

- All varieties of rice are widely varied in respect of physical, thermal, chemical and organoleptic! eating quality characteristics. Amongst all varities BIS(PBY) gives the best response on the basis of overall organoleptic score and kranti appeared to be most superior in the protein content. NDR-359 were found to be best on the basis of Total amylase content.
- In U.P. grown varieties, Kranti appeared to be most superior in protein content and on the basis of high kernel elongation ratio Mansoori gives the best response. Variety NDR-359 was found to be the best considering Total amylose content and Volume expansion ratio.
- Variety BIS(PBY) were found to be superior on the basis of over all organoleptic score awarded by the taste panel. Variety NDR-359 appeared to be the best considering Total amylose content and Volume expansion ratio. Amongst all variety kranti on the basis of high protein content, was adjudgedd the superior variety, followed by Mansoori and CSR-13. Mansoori were also found tobe the best variety in higher kernel

elongation ratio point of view. So all above mentioned varieities suggested to house wives for kitchen purposes on the basis of their quality characteristics.

Table 1: Physical Characteristics of Different Varieties of Paddy/Rice Kernel

Varieties	Hulling (%)	Milling (%)	Moisture content (%)	Test weight (g)	Head rice recovery (%)	Chalkiness (%)	Length (rice kernel)	Breadth (Rice kernel)
ASHWANI	80.10	74.60	11.60	16.30	75.20	16.10	9.02	2.03
KRANTI	70.40	73.50	10.20	18.34	71.10	28.20	6.48	3.01
MANSOORI	75.24	73.60	12.80	17.47	50.20	8.80	6.02	1.86
PANT - 12	79.40	70.20	12.30	17.97	65.30	12.20	8.02	3.01
CSR-10	70.40	67.50	11.40	15.81	70.20	13.50	6.47	3.02
CSR-13	79.50	67.03	11.60	18.25	75.20	16.50	8.03	3.01
NDR-359	72.03	70.01	10.30	14.51	70.10	28.10	8.02	3.01
BJS (PBY)	69.40	64.50	13.04	20.41	65.20	22.00	6.07	3.02
MEAN	74.57	70.13	11.70	17.38	67.69	18.18	7.27	2.75
S.E.(d)	0.09	0.08	0.07	16.86	0.07	0.08	0.006	0.02
C.D 5%	0.19*	0.17*	0.15*	NS	0.15	0.17***	0.013*	0.042

Significant at 5% level

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TRADITIONAL USES OF MEDICINAL PLANTS IN JAUNPUR DISTRICT, UTTAR PRADESH

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ABSTRACT

The plants occupy a distinct place in the life of human-beings right from the primitive period till date. The present paper deals with enumeration of fifty seven medicinally important plants frequently used by the local communities of Jaunpur district, Uttar Pradesh for the treatment of different ailments such as cold, cough, fever, gastro-intestinal disorders, rheumatism and skin diseases etc.

Key words : *Medicinal plants, traditional, human health.*

Plants have been used in the traditional healthcare system from time immemorial, throughout the world and still continue to occupy an important place in traditional as well as modern system of medicine. (Jha and Kumar, 2003 ; Shukla and Gardner, 2006). India is the largest producer of medicinal herbs and is called the botanical garden of the world. Our traditional systems of medicines, viz., Ayurveda, Yunani, Siddha and Homeopathy etc. use herbs for treatment. In rural India, 70 percent of the population depends on the traditional type of medicine, the Ayurveda. With the scripts in the Atharva Veda, we have evidence of a traditional use of medicinal plants that is more than 3000 years old. The knowledge about plants and plant products is detailed , sophisticated, and has evolved into a separate shastra itself, called Dravya Guna Shastra. Plants have been studied on the basis of clearly defined biological parameters like rasa (taste), vipaka (metabolic property), guna (quality), prabhava (biological effect) and virya (potency). Traditional herbal remedies are regarded as safe, cost effective, easily affordable with no side effects and due to this fact global demand for herbal medicines is continuously increasing. The natural products symbolize safety in contrast to the synthetic drugs (Gill *et. al.,* 2011). According to WHO (2002), approximately 20,000 plants are medicinally important plants and about 80% of the world's people depend on traditional medicine for their primary health needs (Negi *et. al.,* 1993, Singh *et. al.,* 1997) .The medicinal plants have great significance (Srivastava *et. al.,* 2002) not only due to their use in herbal therapy but also in the concept of environmental and ecological aspect (Sharma, 2005). Plantation of medicinal plants is also helpful to save our environment (Ambasht and Ambasht 1992). The agenda 21 of the Rio Earth Summit stated that the indigenous people and their communities play a vital role in environmental management and development because the

Table 2: Physical Characteristics of Different Varieties of Paddy/Rice Kernel

Varieties	L/B ratio (rice kernel) (mm)	Length paddy (mm)	Breadth paddy (mm)	L/B ratio (paddy)	Seed grade
ASHWANI	4.47	9.21	3	2.81	Long slender
KRANTI	2.2	7.6	3.5	2.3	Long slender
MANSOORI	3.2	8.8	2.9	3.28	Long slender
PANT - 12	2.7	8.4	3	2.68	Short slender
CSR-10	2.1	8.1	3.2	2.56	Short bold
CSR-13	2.7	9.03	3.2	2.81	Medium slender
NDR-359	2.7	9.02	3.22	2.8	Long bold
BJS (PBY)	1.99	9.2	3.03	3.18	Short bold
MEAN	2.76	8.68	3.13	2.81	
S.E.(d)	0.006	0.063	0.04	0.16	
C.D 5%	0.013*	1.134*	0.08*	0.34*	

Significant at 5% level

Table 3: Thermal Characteristics of Different Varieties of Rice

Varieties	Water uptake (ml/100 g)	Volume expansion ratio	Kernel elongation (mm)	Kernel elongation ratio
ASHWANI	1175	4.21	1.16	1.28
KRANTI	192.5	3.66	9.5	1.47
MANSOORI	187.5	5.25	11.4	1.91
PANT - 12	77.5	4.95	11.6	1.45
CSR-10	222.5	2.66	9.8	1.52
CSR-13	137.5	4.66	10.5	1.31
NDR-359	102.5	5.45	10.5	1.17
BJS (PBY)	75.3	3.61	8.3	1.387
MEAN	139.09	4.43	9.4	1.44
S.E.(d)	0.082	0.006	0.08	0.006
C.D 5%	0.173*	0.127*	0.17*	0.013*

Significant at 5% level

Table 4: Protein Characteristics of Different Varieties of Rice

Varieties	Protein content (%)	Total amylase (%)	Soluble amylase (%)	Insoluble amylase (%)
ASHWANI	9.82	31.62	3.71	27.91
KRANTI	11.23	25.03	2.65	22.37
MANSOORI	11.08	21.22	1.17	20.05
PANT - 12	10.56	28.77	1.9	26.79
CSR-10	9.41	29.24	2.88	26.38
CSR-13	10.65	32.25	4.2	28.06
NDR-359	9.62	34.55	2.57	31.98
BJS (PBY)	9.41	26.21	1.85	24.36
MEAN	10.37	28.61	2.63	25.99
S.E.(d)	0.04	0.08	0.008	0.012
C.D 5%	0.085*	0.017*	0.017*	0.025*

Significant at 5% level

Table 5: Physical Characteristics of Different Varieties of Paddy/Rice Kernel

Varieties	ASHWANI	KRANTI	MANSOORI	PANT-12	CSR-10	CSR-13	NDR-359	BIS (PBY)	Mean
Appearance	2.6	3.3	3.3	2.9	3.7	4.5	2.7	4.7	3.7
Aroma	2.2	1.7	2.4	2.6	2.1	2.5	3.3	4.8	2.7
Cohesiveness	2.4	2.3	2.9	3.2	4.2	3.3	2.8	3.7	3.1
Tenderness	1.8	3.1	3.78	2.2	1.8	3.7	2.8	3.3	2.8
Taste	2.8	2.7	3.3	2.4	3.4	4.3	2.7	3.9	3.19
Mean	2.4	2.6	3.1	2.7	3	3.7	2.9	4.1	3.05

	S.E. (d)	C.D. 5%
Varieties (V)	0.004	0.07**
Organoleptic (O)	0.03	0.06**
Variety x organoleptic	0.08	0.16**

Significant at 5% level

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significant. This result was tally with observations of Bajpai (2006), Singh (2006)

CONCLUSION

It was concluded that the gestation period 270-280 days has highest lactation milk yield, longest lactation length and highest butter fat yield among the different crossbred cows. Shorter dry period and shorter calving interval are also observed in the gestation period 270-280 days (GP1) among the different crossbred cows Local x Local, Local x HF, and Local x Jersey.Among these crossbred animals Local x HF has highest lactation milk yield, longest lactation length, highest butter fat yield, shorter calving interval and shorter dry period.

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Jersey crossbred cattle pertaining to GP1, GP2, GP3 and GP4 are 330.312, 310.4706, 303.66 and 292.6 days, respectively and differences in their period of first lactation length were found significant, the results with report to longest lactation length are in agreement with observations of Acharya (1989).

3) Effect of gestation period on first dry period (days) :

The mean first dry period of Local x Local crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 67.588, 80.625, 106.4615 and 107.8571 days respective and differences in of dry period due to gestation period were found significant.The mean first dry period of Local x Holstein Friesian crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 92.307, 96.433, 98.60 and 99.33 days respectively and differences in of dry period due to gestation period were found non-significant.These results were agreement with Anjum Akhtar (2007) and Banerjee and Banerjee (2003).The mean first dry period of Local x Jersey crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 97.123, 99.364, 100.12 and 105.75 days respectively and differences in of dry period due to gestation period were found non-significant.These results were tally with observation of Anjum Akhtar (2007).

4) Effect of Gestation period (GP) on calving interval (days) :

The mean calving interval of Local x Local crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 502.4615, 528, 539.8 and 564.08 days, respectively and differences in these values of calving interval were found non-significant. The mean calving interval of Local x Holstein Friesian crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 2744.09, 2461.13, 2546.11 and 2354.340 days, respectively and differences in these values of calving interval were found significant. These results were tally with observation of Bajpai (2006),Roy (1983), Acharya (1989), and Prasad and Maji (1992), Bala and Nagarcenkar (1981), Rao and Taneja (1980), and Banerjee and Banerjee (2003).The mean calving interval of Local x Jersey crossbred cattle pertaining to GP1, GP2, GP3 and GP4 was 381.9375, 398.8, 472.54 and 487.76 days, respectively and differences in these values of calving interval were found significant.The results with report to length of calving interval are in agreement with observation of Roy (1983), Acharya (1989), Prasad and Maji (1992), and Bajpai (2006).

5) Effect of gestation period on first lactation butter fat yield (FLBFY):

The mean first lactation butter fat yield (kg) of Local x Local crossbred cows of GP1, GP2, GP3, and GP4 was 23.660, 21.800, 21.324, and 21.021 respectively and differences in the first lactation butter fat yield due to gestation period of cows were found non-significant.The mean first lactation butter fat yield (kg) of Local x HF crossbred cows of GP1, GP2, GP3, and GP4 was 84.915, 76.112, 78.751, and 70.155 respectively and the differences in the first lactation butter fat yield due to gestation period of cows were found non-significant.These results do not tally with observations of Bajpai (2006) and Singh et al (2006). The mean first lactation butter fat yield (kg) of Local x Jersey crossbred cows of GP1, GP2, GP3, and GP4 was 84.688, 76.511, 73.636, and 60.330 respectively andthe differences in the first lactation butter fat yield due to gestation period of cows were found

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ASSESSMENT OF LOSSES IN TOMATO AND BRINJAL CROP DUE TO PLANT PARASITIC NEMATODE AROUND ALLAHABAD

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ABSTRACT

Twenty two tomato and brinjal growing field in Bahadurpur block in around Allahabad were surveyed in the year 2013. Five genera of plant parasitic nematodes viz. *Meloidogyne* sp., *Rotylenchus reniformis, Pratylenchus* sp., *Tylenchus* sp. and *Helicotylenchus* sp. were found in Bahadurpur block around Allahabad. Maheshpur, Neevee, Kanihar were found to higher infection of root-knot nematode in tomato and Munsi-ka-purva, Neevee and Katka were found maximum infection of root-knot nematode in case of brinjal. Nineteen villages showed less than 25% disease intensity in both crops. Predominant rhizosphere plant parasitic nematodes viz. *Meloidogyne* sp., *Rotylenchus reniformis* and *Pratylenchus* sp. were found.

Keyword: *Tomato, brinjal, plant parasitic nematode, disease intensity.*

Tomato *(Lycopericon esculentum)* and Brinjal *(Solanum melongena)* are the most important vegetable crops in India. These crops are highly susceptible to the root-knot nematode. *Meloidogyne* sp. Efforts has been done by many workers, Sitaramaiah *et. al.,* (1971), Sadykhov (1970), Bhatti and Jain (1977), Grace *et. al.,* (2009) and Pant (2013). Thus the survey was conducted in different vegetable growing villages and assed the disease intensity, infection index along with the status of plant parasitic nematodes.

MATERIALS AND METHODS

Survey on plant parasitic nematodes were conducted in the twenty two selected villages in Bahadurpur block around Allahabad in the year 2013. Diseased and healthy root samples of the crop along with 500gm. rhizosphere soil were collected in polythene bags to study the association of nematode with the roots. Root-knot nematode counted and calculated infection index of the tomato and brinjal crop. 500gm. of soil from each sample were processed for nematode extraction in the following manner as per method described by Southey (1970). The disease intensity and infection index were calculated by using the formula given below.

$$\text{Disease intensity} \quad \frac{\text{Number of diseased plant}}{\text{Total number of plant}} \times 100$$

$$\text{Infection Index} \quad \frac{\text{Sum of Scores}}{\text{Number of plant} \times 5} \times 100$$

RESULTS AND DISCUSSION

Higher infection of root-knot was found to Mahespur in tomato followed by Neevee, Kanihar, Katka, Badra, Patelnagar, Bhageepur, Tulapur and Narayandas Ka Purva in tomato. Maximum root-knot nematode was observed in Munsi Ka Purva, Neevee, Katka, Badra, Sherdeeh, Kanihar, Patelnagar and Bhageepur in brinjal crop. The root-knot index observed as follows Mahespur (4.80), Neevee (3.70), Tulapur (3.50) and Katka (3.20) in tomato and

Munsi Ka Purva (4.60), Neevee (3.20), Pure soordas and Katka (3.00) in brinjal. Similar obsrvation made by Pant (2013). The disease severity caused by root-knot nematode as so for not much assed in the Bahadurpur block around Allahabad but its survey appear to essential because of the economic importance of the both crop. The intensity of disease caused by root-knot nematode is directly related to crop yield. The association of rhizosphere soil nematode viz. *Meloidogyne* sp., *Rotylenchus reneformis, Praytylenchus* sp., *Tylenchus* sp. and *Helicotylenchus* sp. were also predominant in tomato and brinjal. Similar observation made by Edward (1972), Edward et.,al (1977), Pant (2013).

Table-1: Percentage of Tomato and Brinjal plant infected with root-knot disease in different villages

S. No.	Village	Percentage of Tomato plant infected		Percentage of Brinjal plant infected	
		Root-knot	Root-knot Index	Root-knot	Root-knot Index
1.	Pure Soordas	7.00	2.40	5.00	3.00
2.	Lapetua	5.00	3.00	5.00	2.20
3.	Sonwatee	13.00	2.20	10.00	1.80
4.	Munshi Ka Purva	10.00	1.80	70.00	4.60
5.	Badra	20.00	3.00	24.00	2.90
6.	Dhool Bazwa	2.00	1.60	12.00	1.50
7.	Tulapur	15.00	3.50	17.00	1.50
8.	Durjahpur	11.00	2.20	15.00	2.00
9.	Rahimapur	13.00	4.00	18.00	2.10
10.	Sherdeeh	10.00	1.80	22.00	2.00
11.	Patelnagar	15.00	2.20	20.00	1.90
12.	Maheshpur	80.00	4.80	10.00	1.80
13.	Narayandas Ka Pura	15.00	3.50	10.00	1.80
14.	Kanihar	30.00	4.20	20.00	2.00
15.	Bandwa Taheerpur	7.00	2.40	8.00	2.60
16.	Jhusi	12.00	2.10	5.00	3.00
17.	Andawa	2.00	0.80	5.00	3.00
18.	Chack Hariharwan	0.00	0.00	0.00	0.00
19.	Kuwadeeh	12.00	1.90	1.70	1.80
20.	Bhageepur	15.00	2.20	20.00	2.20
21.	Neeve	50.00	3.70	35.00	3.20
22.	Katka	24.00	3.20	35.00	3.00
	Mean	16.72	2.67	17.40	2.26

CALVING INTERVAL

SI. No	Crossbred cows	Mean value			
1	Local x Local	GP_1 502.4615days a	GP_2 528 days a	GP_3 539.8 days a	GP_4 564.08 days a
2	Local x HF	GP_1 371.9 days a	GP_2 385 days b	GP_3 396.95 days bc	GP_4 441.15 days c
3	Local x J	GP_1 381.93 days a	GP_2 398.8 days a	GP_3 472.54 days b	GP_3 487.76 days b

BUTTER FAT YIELD (KG)

Sl No	Crossbred cows	Mean value			
1	Local x Local	GP_1 23.660 kg a	GP_2 21.800 kg a	GP_3 21.324 kg a	GP_4 21.021 kg a
2	Local x HF	GP_1 84.915 kg a	GP_3 78.751kg a	GP_2 76.112 kg a	GP_4 70.155 kg a
3	Local x Jersey	GP_1 84.688 kg a	GP_2 76.511 kg a	GP_3 73.636kg ab	GP_4 60.330 kg b

1) Effect of gestation period on subsequent lactation milk yield (LMY) :

The mean first lactation milk yield (kg) of Local x Local crossbred cattle pertaining to GP1, GP2, GP3, and GP4 was 568.1077, 523.4, 512, and 504.916 kg respectively.The differences in first lactation milk yield due to gestation period were found non-significant.The mean first lactation milk yield (kg) of Local x Holstein Friesian crossbred Cattle pertaining to GP1, GP2, GP3, and GP4 were 2744.09, 2461.13, 2546.11, and 2354.340 kg respectively.With The differences in first lactation milk yield due to gestation period were found non-significant average milk yield are in agreement Patroand Bhat (1979) and Acharya (1989), Buvanendran and Mahadevan(1975), Bala and Nagarcenkar (1981). The mean first lactation milk yield (kg) of Local x Jersey crossbred cattle pertaining to GP1, GP2, GP3, and GP4 was 2740.106, 2474, 2273.4, and 2117.44 kg respectively.The differences in first lactation milk yield due to gestation period were found significan.Similar result were reported by Bjpai (2006) and Arjun Akhtar (2007) Banerjee and Banerjee, (2003).

2) Effect of gestation period on first lactation length (days) :

The first lactation length of Local x Local crossbred cattle pertaining to GP1, GP2, GP3and GP4 was 280.6769, 253.930, 253.21 and 249.083 days, respectively and these differences in their period of first lactation length were found non-significant. The first lactation length of Local x Holstein Friesian crossbred cattle pertaining to GP1, GP2, GP3 and GP4 are 335.3889, 302.00, 319.222 and 284.00 days, respectively and differences in their period of first lactation length were found significant. The first lactation length of Local x

field visits and personal contact with the farmers over a period of five months (Jan – May 2013) the data on Lactation milk yield, Lactation length, Dry period, Butter fat yield, gestation period and calving interval were recorded and were classified according to Gestation Period. The abnormal incomplete records of lactation less than 150 days were excluded and records of cows having completed at least one full lactation were included, and analyzed by one way classification of analysis of variance (Snedecor andCochran, 1981)

RESULTS AND DISCUSSION

The data pertaining to genetic group of cows, gestation period GP1- 270 to 280 days, GP2- 280 to 286, GP3- 286 to 290 days, GP4- above 290 days, first lactation milk yield of 305 days (kg), First lactation butter fat yield,(FLBFY) first lactation length (days), dry period (days) and calving interval (days) were collected from by providing questionnaires, frequent field visits and personal contact with the farmers over a period of one year (2011-2012) around Allahabad District, Chaka block. The results summarized are as follows:

FIRST LACTATION MILK YIELD

S N.	Crossbred cows	Mean value			
1	Local x Local	GP_1 568.1077 kg a	GP_2 523.4 kg a	GP_3 512 kg a	GP_4 504.9167kg a
2	Local x Holstein Friestian	GP_1 2744.09 kg a	GP_3 2546.11 kg a	GP_2 2461.13 kg a	GP_4 2354.340 kg a
3	Local x Jersey	GP_1 2740.106 kg a	GP_2 2474 kg ab	GP_3 2273.4 kg bc	GP_4 2117.44 kg c

LACTATION LENGTH

S.No	Crossbred cows	Mean value			
1	Local x Local	GP_1 280.6769days a	GP_2 253.930 days a	GP_3 253.21 days a	GP_4 249.083days a
2	Local x HF	GP_1 335.388 days a	GP_3 319.22 days ab	GP_2 302.00 days ab	GP_4 284.00 days b
3	Local x J	GP_1 330.312ays a	GP_2 310.4706days b	GP_3 303.66 days b	GP_4 292.6 days b

DRY PERIOD

S.No	Crossbred cows	Mean value			
1	Local x Local	GP_1 183.200 days a	GP_2 221.815 days a	GP_3 220.250days b	GP_4 299.733 days c
2	Local x HF	GP_1 92.30 days a	GP_2 96.433 days a	GP_3 98.6 days a	GP_4 99.33 days a
3	Local x J	GP_1 97.123 days a	GP_2 99.364 days a	GP_3 100.12 days a	GP_4 105.75 days a

Table-2: Number of Villages recording disease in different category of infection in Tomato and Brinjal

Disease	Plant Category of Infection							
	0-25		26-50		51-75		76-100	
	Tomato	Brinjal	Tomato	Brinjal	Tomato	Brinjal	Tomato	Brinjal
Root Knot	19	19	2	2	00	1	1	00
Mean	19	19	2	2	00	1	1	00

Table-3: Total Number of rhizosphere nematode of various genera in Tomato and Brinjal

Sample No.	Place	*Meloidogyne sp.*		*Rotylenchus Reniformis*		*Pratylenchus sp.*		*Tylenchus sp.*		*Helicotylenchus sp.*		
		Tomato	Brinjal	Tomato	Brinjal	Tomato	Brinjal	Tomato	Brinjal	Tomato	Brinjal	
1.	Pure Soordas	60.00	20.00	50.00	14.00	---	10.00	1.00	---	2.00	---	1.00
2.	Lapetua	62.00	10.00	10.00	20.00	12.00	---	5.00	7.00	---	---	---
3.	Sonwatee	150.00	2.00	---	21.00	---	7.00	---	---	---	---	---
4.	Munshi Ka Purva	15.00	155.00	---	5.00	---	15.00	---	---	---	---	---
5.	Badra	7.00	10.00	---	---	7.00	---	---	---	---	---	---
6.	Dhool Bazwa	2.00	7.00	---	---	2.00	13.00	1.00	9.00	2.00	---	1.00
7.	Tulapur	100.00	25.00	25.00	10.00	---	---	7.00	2.00	---	---	---
8.	Durjahpur	9.00	10.00	---	---	10.00	10.00	---	1.00	5.00	2.00	---
9,	Rahimapur	3.00	10.00	---	2.00	5.00	---	1.00	2.00	1.00	2.00	---
10.	Sherdeeh	7.00	22.00	---	3.00	7.00	2.00	---	---	2.00	---	---
11.	Patelnagar	15.00	22.00	---	---	---	---	---	---	---	---	---
12.	Maheshpur	20.00	90.00	100.00	10.00	---	---	1.00	1.00	2.00	---	---
13.	Narayandas Ka Pura	175.00	102.00	7.00	5.00	3.00	1.00	3.00	4.00	---	---	---
14.	Kanihar	20.00	45.00	25.00	40.00	---	---	4.00	---	---	---	---
15.	Bandwa Taheerpur	20.00	10.00	15.00	3.00	10.00	1.00	---	---	---	---	---
16.	Jhusi	7.00	7.00	5.00	---	---	2.00	---	---	---	---	---
17.	Andawa	5.00	37.00	---	25.00	13.00	---	---	---	---	---	---
18.	Chack Hariharvan	---	---	---	---	---	3.00	---	---	---	---	---
19.	Kuwadeeh	21.00	25.00	2.00	15.00	12.00	---	---	---	---	---	---
20.	Bhageepur	3.00	45.00	3.00	10.00	10.00	---	---	---	---	---	---
21.	Neevee	125.00	55.00	17.00	---	3.00	2.00	5.00	7.00	---	---	---
22.	Katka	22.00	50.00	---	10.00	---	---	---	---	---	---	---
	Total	**758.00**	**759.00**	259.00	**193.00**	**94.00**	**66.00**	**32.00**	**44.00**	**42.00**	**43.00**	
		34.45	**34.50**	**11.70**	**7.72**	**4.20**	**3.00**	**1.45**	**2.00**	**1.90**	**1.95**	

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GENETIC STUDIES ON GESTATION PERIOD AND ITS INFLUENCE ON SOME IMPORTANT ECONOMIC TRAITS IN CROSSBRED CATTLE UNDER FIELD CONDITIONS OF CHAKA BLOCK DISTRICT ALLAHABAD

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ABSTRACT

Gestation period is a physiological trait which begins with conception and end with termination of pregnancy. It means the period from conception to parturition or the birth of calf. The duration of pregnancy depends on the species, breed and sex of the foetus. It ranges from 273 to 296 day with an average of 281 days in cattle. However, gestation period may vary for a few days among the animal and between breeds. Gestation period of the dam has a profound influence on the survivability and future performance on Calving interval, length of lactation, lactation milk yield, butter fat yield and dry period. With this in view the present study entitled "Genetic studies on gestation period and its influence on some important economic traits in Local x Local, Local x Holstein Friestian, and Local x Jersey crosses were undertaken. The gestation period 270-280 days has highest lactation milk yield, longest lactation length and highest butter fat yield among the different crossbred cows. Shorter dry period and shorter calving interval are also observed in the gestation period 270-280 days (GP1) among the different crossbred cows Local x Local, Local x HF, and Local x Jersey. Among these crossbred animals Local x HF hashighest lactation milk yield, longest lactation length, highest butter fat yield, shorter calving interval and shorter dry period.

Key words : *Gestration period, cows, milk yield.*

Gestation period (GP) is a physiological trait which begins with conception and ends with termination of pregnancy. It ranges from 273 to 286 days with average of 281 days in cattle. Gestation period varies a few days among the animals within the breeds and it also depends and on sex of fetus and species of livestock. It has a profound influence on survivability and future performance of the neonate calf (Banerjee andBanerjee, 2003). Present study was undertaken to determine effect of gestation period (GP) on first lactation, economic (milk yield) traits in Local x Local, Local x HF, and Local x Jersey crossbred cows.

MATERIALS AND METHODS

The data pertaining to genetic group of cows, gestation period, GP1 (270 to 280 days), GP2 (281 to 285 days), GP3 (286 to 290 days), GP4 (above 290 days), first lactation milk yield of 305 days (kg.) and Data of reproductive and Productive traits of dairy cows in and around the Chaka block Allahabad District Chaka was collected by providing questionnaires, frequent