Journal of Natural Resource and Development 9 (2) : 1-12 , 2014

STUDIES ON MANAGEMENT OF EARLY BLIGHT DISEASE CAUSED BY ALTERNARIA SOLANI ON TOMATO CROPS THROUGH FUNGICIDES, CRUDE PLANT EXTRACTS AND BIOCONTROL AGENTS

Rajesh Kumar Pandey
Department of Botany
Bundelkhand University, Jhansi-284128 (U.P.) India

Received : 22.05.2014 *Accepted : 12.06.2014*

ABSTRACT

In present study, fungicides, crude extract of plant and biocontrol agents were systematically tested against early blight disease causing pathogen Alternaria solani on tomato. Among all the tested fungicides viz. copper oxychloride-Blue copper, Carbendazim-Bavistin 50% WP, Mancozeb-Dithane M-45, Iprodione-Rovral-50WP and Chorothalonil-Kavach-75 WP at 25, 50, 75, 100, 250, and 500ppm concentrations against *A. solani* in present study, out of which Mancozeb was found most effective in inhibition of radial growth and sporulation of mycelium of *A. solani* while Zingiber officinale, as a representative of botanical antagonist, showed quite comprehensive performance in inhibition of radial growth and sporulation of mycelium of *A. solani* followed by Azadirachta indica, *Lantana camera, Ocimum sanctum, Phyllanthus niruri, Artemisia vulgaris.* Amongst different isolates of *Trichoderma harzianum T. viride, T. virens* and *Pseudomonas fluorescens, T. virens* exhibited inhibition in radial growth and sporulation of mycelium of *A. solani* on great extent in in vitro study.

Keywords : Early blight, tomato, biocontrol agent.

The main causal agent of early blight, the noxious disease of solanaceous crops, is generally considered to be Alternaria solani. Early blight is an economically important disease of worldwide importance affecting solanaceous crops and their wild relatives (Neergaard 1945; Sherf and MacNab 1986; Rotem1994; Vander waals et al. 2004; Chaerani and Voorrips 2006; Kumar et al. 2007). This disease can cause yield losses that occasionally reach 20 % for potato and 78 % for tomato (Rotem 1994). Early blight occurs in all regions of India, where potato and tomato are cultivated. The main causal agent of early blight is generally considered to be *Alternaria solani.* It is a ubiquitous fungus which was previously presumed to infect eggplant and nightshade in addition to tomato and potato (Neergaard 1945) as well as non-solanaceous plants (Akhtar et al. 2011). Tomato is one of the most important vegetable crops of India which is severely affected by wide range of fungal diseases, out of which early blight disease predominantly caused by *Alternaria solani.* Disease appeared on all above ground parts of plants particularly

stem, petiole, flowers and fruits (Pandey et al. 2002). The disease severity was recorded up to 90 per cent in Indo-Gangetic region of the country (Pandey et al., 2002). The yield loss of tomato fruit was 78 percent was recorded at 72 percent disease intensity of *A. solani* (Datar and Mayee, 1985). The yield loss in experimental field was recorded as high as 86 percent in the fungicide treated crop of tomato (Pandey and Pandey 2003). Lodha (1977) recorded upto 50 percent losses caused by *A. solani* in tomato. Inspite of a lot of work done on the chemical management of this disease, invariably it was found ineffective in its economic management. One of the reasons would be lack of systematic and proper integration different component of integrated disease management in accordance with weather forecast information on the epidemiological aspects of the disease. The aim of the current study is to compare the relative efficacy of the antagonistic biocontrol agents with the botanicals and conventional chemical products under in-vitro and in-vivo conditions in order to use such a strategy in an eco-friendly and sustainable integrated disease management practices.

MATERIALS AND METHODS

Fungicides Bioassay

Efficacy of five fungicides (viz. copper oxychloride-Blue copper, Carbendazim-Bavistin 50% WP, Mancozeb-Dithane M-45, Iprodione-Rovral-50WP and Chorothalonil-Kavach-75 WP) against mycelia growth and sporulation of *Alternaria solani* was tested in-vitro by food poisoned techniques (Schimitz, 1930). Five different concentrations of 25, 50, 75, 100, 250, and 500 ppm of each fungicide were used. A stock solution 5000 ppm of each fungicide was prepared by adding 50 ml/250mg acetone. Required quantity of stock solution was added in 54 ml sterilized semisolid autoclaved potato dextrose agar PDA medium containing conical flask with thorough mixing at the time of pouring in 90 mm petriplates in 8 replications to maintain the above concentrations separately by following the completely randomized design (CRD) and then poisoned medium allowed to solidify. Each 90mm plate was inoculated in centre with 5mm disc of 7 days old culture of the *A. solani* along with control and incubated in BOD incubator at 25±20C for 6 days. The percent inhibition was calculated using prescribed formula.

The percent growth inhibition was calculated by the following formula

Percent inhibition in radial growth of mycelium

$$= \frac{Cd-Td}{Cd} \times 100$$

Cd = Colony diameter/radial growth of pathogen in control

Td = Colony diameter/radial growth of pathogen in treatment

PLANT EXTRACT BIOASSAY

Mycelial and sporulation growth inhibitory activity was studied through utilizing

six natural plant extracts Neem *(Azadirachta indica)* leaves, Ginger *(Zingiber officinale Rosc.)* rhizome, Tulsi *(Ocimum sanctum)* leaves, leaves of *Phyllanthus niruri,* leaves of *Artemisia vulgaris* leaves of *Lantana camera* against *A. solani,* Each plant extract was tested at 25, 50 and 75ppm concentrations. Shade dried leaf powder of the plant material (2.5kg) of each one was subjected to extraction with hexane at ambient temperature. The material was placed in 5 liter Erlenmeyer flasks and soaked by filtration through whatman no. 1 filter paper to remove insoluble debris and concentrated in vacuo (low pressure) and reduced temperature (40-420C) in a rotary evaporator (Heidolph, Germany). Extracts were concentrated in vacuo to obtain crude hexane extract. The crude extract of each plants were kept under low temperature (-400C) in the refrigerator until use. Test compounds were dissolved in hexane as per the requirement, to yield a 5000ppm stock solution. From stock solution various concentrations as desired, were prepared by serial dilution in potato dextrose medium. The effect of plant crude extract on mycelium growth and sporulation of *A. solani* was tested by poisoned food technique (Schimitz 1930). Required quantity of each plant crude extract stock solution was mixed thoroughly in melted PDA to get desired concentration just before pouring in sterilized perti plates and allowed to solidify. Method of inoculation, design and observations recorded as in fungicidal test. Adequately control was maintained without adding plant crude extract in PDA and incubated in BOD incubator at 25±20C for 6 days. The percent inhibition was calculated using prescribed formula.

Percent inhibition in radial growth of mycelium

$$= \frac{Cd-Td}{Cd} \times 100$$

Cd = Colony diameter/radial growth of pathogen in control

Td = Colony diameter/radial growth of pathogen in treatment

BIOASSAYS OF ANTAGONISTIC BIOCONTROL AGENTS

Various isolates of *Trichoderma harzianum* (ITCC No. 6797), *T. harzianum* (NBAII Th 1), *T. viride* (ITCC No. 2109), *T. viride* (NBAII Tv 23), *T. virens* (ITCC No. 4177) and *T. virens* (NBAII Tvs 12T) were included in the present study to evaluate the potentiality against early blight disease causing pathogen A. solani on tomato, which were procured from Indian Type Culture Collection (ITCC), Davison of Plant Pathology, IARI, New Delhi and NBAII of India respectively. In addition to this, one local isolate of *T. harzianum* was also collected from culture collection of Department of Botany, Bundelkhand University, Jhansi while another bacterial biocontrol agents *Pseudomonas fluorescens* has been procured from Department of Plant Pathology, College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh.

DUAL CULTURE TECHNIQUE

Trichoderma harzianum (ITCC No. 6797), *T. harzianum* (NBAII Th 1), *T. viride* (ITCC No. 2109), *T. viride* (NBAII Tv 23), *T. virens* (ITCC No. 4177) and *T. virens* (NBAII Tvs 12T) *Trichoderma harzianum* (BU) and bacteria *Pseudomonas fluorescens* (CHF-CAU) were evaluated against *A. solani* under laboratory conditions by a dual culture technique described by Morton and Stroube (1955) to select the most potent one for further studies. Inoculation was conducted using a 5 mm diameter mycelial disc (7 days old) of pathogenic *A. solani* along with fungal and bacterial biocontrol agents on separate PDA contained in petri plates with 90 mm diameters at equal distance from the periphery. Inoculated plates were placed in an in B.O.D. incubator at 25±2ºC and radial growth of A. solani was measured at intervals of 2, 4, 6 and 8 days after inoculation. Adequate control was maintained in which only 5 mm diameter mycelial disc *A. solani* inoculated centrally with ten replications for each treatment. Percent inhibitions of radial growth of *A. solani* were calculated using the prescribed formula.

From the zone of inhibition between the antagonistic fungal and bacterial and test pathogens A. solani in dual culture plate, the mycelial mats were gently lifted with a needle and put in a drop of cotton blue on a microscopic slide and spread with a needle and observed under microscope for hyphal interaction.

$$I = \frac{C-T}{C} \times 100$$

I = Percent growth inhibition

C = Colony diameter of pathogen in control

T = Colony diameter/radial growth of pathogen in treatment

The percent inhibition data were transformed in Sin-1 percentage transformation and analyzed statistically in completely randomized design (CRD). Data were statistically analysed using M-STAT computer package for test of significance (critical differences) at 5% level (Syndecor and Cochran 1967) and the mean values of two years data were presented in tabular form.

RESULTS AND DISCUSSION

Effect of fungicides

Among all the tested fungicides viz. Copper oxychloride, Carbendazim, Mancozeb, Iprodione and Chorothalonil at 25, 50, 75, 100, 250, and 500ppm concentrations to know the inhibition capacity of radial growth and sporulation of mycelium of *A. solani,* a disease causing agent, Mancozeb showed drastic inhibition in mycelial growth of *A. solani* followed by Copper oxychloride and Iprodione respectively while Carbendazim at the similar conditions showed least inhibition in mycelial growth followed by Chorothalonil. There was apparent trend of increase in the inhibition in sporulation and radial growth of mycelium of

A. solani with increase in level of concentration in treatment as compared to the control. Mancozeb and Copper oxychloride was found significantly at par all the level of concentration as depicted in Table-1.

Table-1. Effect of fungicides on sporulation and radial growth inhibition of mycelium of *A. solani*

S. No.	Fungicides	Inhibition of radial growth of mycelium (concentration in ppm						Mean	Sporulation
		25	50	75	100	250	500		
1.	Carbendazim-Bavistin 50% WP	18.50 (25.48)	23.81 (29.21)	28.30 (32.14)	31.45 (34.11)	37.49 (37.76)	43.20 (41.09)	30.46 (33.30)	++++
2.	copper oxychloride-Blue copper, ,	46.89 (43.22)	53.80 (47.18)	58.92 (50.14)	66.40 (54.58)	69.10 (56.23)	72.56 (58.41)	61.28 (51.63)	+
3.	Mancozeb-Dithane M-45,	48.25 (44.00)	56.40 (48.68)	61.82 (51.84)	68.31 (55.74)	70.20 (56.91)	74.30 (59.54)	63.21 (52.79)	+
4.	Iprodione-Rovral-50WP	36.40 (37.10)	39.42 (38.89)	44.30 (41.73)	49.20 (44.54)	53.00 (46.72)	61.28 (51.52)	47.27 (43.42)	++
5.	Chorothalonil-Kavach-75 WP	32.50 (34.76)	34.97 (36.25)	41.50 (40.11)	48.40 (44.08)	54.28 (47.46)	59.20 (50.30)	45.14 (42.16)	+++
SEm ±		(0.72)	(0.92)	(0.28)	(0.78)	(0.43)	(0.41)		
LSD (P=0.05)		(1.20)	(1.69)	(1.83)	(2.10)	(1.47)	(2.95)		
Figures in parentheses are transformed angular values									
Mean of eight replications									
Note: + = Fair, + + = Good, + + + = Very Good, + + + + = Excellent									

EFFECT OF CRUDE PLANT EXTRACT

All the tested crude plant extract at concentrations of 25, 50, 75 ppm were found significantly superior over the control in inhibition of sporulation and radial growth of mycelium of *A. solani.* Irrespective of the concentration, crude extract of Zingiber officinale rhizome was found most effective in inhibiting the sporulation and radial growth of mycelium of *A. solani* followed by crude extract of leaf of *Azadirachta indica,* leaf of *Ocimum sanctum,* leaf of *Lantana camera,* leaf of *Phyllanthus niruri,* and leaf of *Artemisia vulgaris,* as compared to the control mentioned in Table-2.

Table-2. Effect of crude plant extract on sporulation and radial growth inhibition of mycelium of *A. solani*

S. No.	Name of Plant	Inhibition of radial growth of mycelium (%) (Concentration in ppm)			Mean	Sporulation
		25	50	75		
1.	Neem (*Azadirachta indica*) leaves	48.90 (44.37)	67.20 (55.06)	75.40 (60.27)	63.83 (53.23)	+
2.	Ginger (*Zingiber officinale* Rosc.) rhizome	52.37 (46.36)	69.21 (56.30)	78.58 (62.43)	66.72 (55.03)	+
3.	Tulsi (*Ocimum sanctum*) leaves	45.87 (42.63)	60.20 (50.89)	64.40 (53.37)	56.82 (48.96)	++
4.	leaves of *Phyllanthus niruri*	42.40 (40.63)	54.80 (47.75)	58.80 (50.07)	52.00 (46.15)	+++
5.	leaves of *Artemisia vulgaris*	41.30 (40.00)	53.00 (46.72)	56.40 (48.68)	50.23 (45.13)	+++
6.	Leaves of *Lantana camera*	44.10 (41.61)	58.90 (50.13)	73.50 (59.02)	58.83 (50.25)	
SEm ±		(0.13)	(0.34)	(0.12)		
LSD (P=0.05)		(0.85)	(0.98)	(0.67)		
Figures in parentheses are transformed angular values						
Mean of eight replications						
Note: + = Fair, + + = Good, + + + = Very Good, + + + + = Excellent						

EFFECT OF ANTAGONISTIC BIO-CONTROL AGENTS

Dual culture test

Among the antagonists tested, *T. virens* (NBAII Tvs 12T) showed maximum radial colony growth inhibition (85.30%) of *A. solani* at the 10th day after incubation followed by *T. virens* (ITCC No. 4177), *T. viride* (NBAII Tv 23), *T. viride* (ITCC No. 2109), *T. harzianum* (NBAII Th1), T. harzianum (ITCC No. 6797), *Pseudomonas fluorescens* (CHF-CAU) and *T. harzianum* (BU) mentioned in Table-3. Similar trends were observed in colony growth inhibition percentages after the 8th day following incubation in which *T. virens* (NBAII Tvs 12T) exhibited maximum radial growth inhibition of *A. solani* as mentioned in Table-3. On the 6th day after incubation, *T. virens* (NBAII Tvs 12T) produced maximum radial growth inhibition of *A. solani* while at the 4th day after incubation; similar findings were recorded with *T. virens* (NBAII Tvs 12T) in maximum radial growth inhibition of *A. solani* as listed in Table-3.

Microscopic observations were made for the hyphal interactions of between antagonistic fungal biocontrol agents *T. virens* (NBAII Tvs 12T), T. *virens* (ITCC No. 4177), T. *viride* (NBAII Tv 23), *T. viride* (ITCC No. 2109), *T. harzianum* (NBAII Th1), *T. harzianum* (ITCC No. 6797), and *T. harzianum* (BU)] and *A. solani.* Observations indicated that hyphae of *Trichoderma* spp. coiled around the hyphae of *A. solani* and killed or lysed them. In some situations *Trichoderma* spp. formed hook or bunch like structures around the hyphae of *A. solani* from which point penetration was initiated. Hyphae of the antagonists either coiled around the hyphae of *A. solani* and penetrated at the point of coiling or entered directly. Bacterial biocontrol agent, *Pseudomonas fluorescens* (CHF-CAU) showed critical lyses in mycelium of *A. solani* by penetrating destruction the cell walls. Sporulation of A. solani was very less in *T. virens* while *T. harzianum* and *T. viride* showed little overgrowth on the mycelium of *A. solani.*

Table-3. Effect of biocontrol agents on sporulation and radial growth inhibition of mycelium of *A. solani*

S. No.	Treatment	Radial growth inhibition (%) of *A. solani*				Mean	Sporulation
		4	6	8	10		
1.	*Trichoderma harzianum* (ITCC No. 6797)	42.78 (40.85)	52.40 (46.38)	64.50 (53.43)	78.25 (62.20)	59.48 (50.46)	++
2.	*T. harzianum* (NBAII Th 1)	44.20 (41.67)	53.79 (47.17)	66.10 (54.39)	80.00 (63.44)	61.02 (51.67)	++
3.	*T. viride* (ITCC No. 2109)	43.20 (41.09)	52.89 (46.66)	65.30 (53.73)	78.97 (62.70)	60.09 (51.04)	++
4.	*T. viride* (NBAII Tv 23)	45.89 (42.64)	54.20 (47.41)	67.40 (55.18)	81.20 (64.30)	62.17 (52.38)	++
5.	*T. virens* (ITCC No. 4177)	46.40 (42.94)	56.40 (48.68)	68.20 (55.67)	83.10 (65.73)	63.53 (53.26)	+
6.	*T. virens* (NBAII Tvs 12T)	45.95 (42.68)	55.30 (48.04)	69.86 (56.70)	85.30 (67.46)	64.10 (53.72)	+
7.	*T. harzianum* BU	42.30 (40.57)	50.20 (45.12)	62.30 (52.12)	78.30 (62.24)	58.28 (50.01)	++
8.	*Pseudomonas fluorescens* CHF-CAU	39.20 (38.76)	51.20 (45.68)	64.30 (53.31)	79.95 (63.40)	58.66 (50.29)	++
S. Em ±		(0.30)	(0.56)	(0.21)	(0.79)		
LSD (P= 0.05)		(0.98)	(1.20)	(0.52)	(0.98)		
Mean of ten replications							
Figures in parentheses are transformed angular values							
Note: + = Fair, + + = Good, + + + = Very Good, + + + + = Excellent							

Currently, world crop protection scenario is swinging towards the management of plant diseases through the use of different safe and ecofriendly means by using integrated disease management (Mukhopadhyay 1994). In the present study, efforts were made to explore the possibility of identifying an ideal and compatible fungicide, botanical and bio-control agent for each other which would be potent weapon for management of early blight disease causing pathogen Alternaria solani on tomato.

In fungicidal test, Mancozeb-Dithane M-45 was found significantly most effective at 25, 50, 75, 100, 250, and 500ppm concentrations to inhibit the radial growth and sporulation of A. solani followed by copper oxychloride-Blue copper, Iprodione-Rovral-50WP Chorothalonil-Kavach-75 WP and Carbendazim-Bavistin 50% WP. In similar, observations have been encountered by Mathur and Shekhawat 1996 on tomato and Chaulwar and Datar (1988) reported that mancozeb was most effective in reducing the disease intensity and increase the yield 'Pusa Ruby.' Patil et. al. (2003) reported that crbendazim was best fungicides to minimize the disease incidencc and highest fruit yield while according to Datar and Mayee (1985), Fentin hydroxide and mancozeb were superior for the controlling the disease. Many other workers viz., Maheshari el al (1991), Bassler, and Hausladen (2003), Kumar et al (2007), Arunakumara et al (2010), Sahu et al (2013) reported mancozeb as most effective fungicide for the management of early blight, and maximum fruit yield. In our finding mancozeb was controlling the disease significantly, and increasing yield but it was found best fungicide among the tested fungicides.

As our aim is replace chemical fungicide with other disease management component for maintaining the population of pathogen below economic threshold level. To achieve the expected result, in present study crude extract of rhizome of ginger was found most effective at 25, 50, 75 ppm concentration in inhibition of radial growth of *A. solani* followed by crude extract of leaf of *Azadirachta indica,* leaf of *Ocimum sanctum,* leaf of *Lantana camera,* leaf of *Phyllanthus niruri,* and leaf of *Artemisia vulgaris,* as compared to the control. In support of present findings several authors including Curtis et al. (2004), Krebs et al. (2006), and Latha et al. (2009) reported that plant extracts from 20 non-host plant species caused a reduction of the early blight disease and suppressed the mycelial growth of *A. solani.* All treatments with tested plant extracts improved the yield of tomato plants compared to the infected control. In conclusion, our study demonstrated that many plant extracts, e.g. from *O. basilicum, A. indica, E. chamadulonsis, D. stramonium, N. oleander,* and *A. sativum*, can be used for the biocontrol of the early blight disease (Sallam et al 2012, Ganie et al 2013). Thus, this method of control can contribute to minimizing the risks and hazards of toxic fungicides, especially on vegetables produced for fresh consumption. Further research into these extracts will identify

the active compounds responsible for their fungicidal activity.

In addition to the fungicide and botanical, biocontrol agents also have been taken in present study as core component. Biocontrol agents were used to circumvent pollution hazards due to non-judicious use of agrochemicals and also to avoid development of resistance in pathogenic fungi to commonly used fungicides. Among all fungal and bacterial biocontrol agents, *T. virens* showed highest potential in inhibition of radial growth and sporulation of mycelium of *A. solani* followed by *T. viride, T. harzianum* and *Pseudomonas fluorescens*. *Trichoderma* strains produce volatile toxic metabolites that impede colonization by antagonized microorganisms. Among these metabolites, the production of antibiotics, viridin, gliovirin, gliosoprenins, enzymes, hormones and some others have been described. These findings are in conformity with Rudresh et al. (2005) who noticed 72.1 and 77.0% growth inhibition of *R. solani* and *F. oxysporum,* respectively by *T. harzianum.* Earlier rapid growth of *T. harzianum* covering the entire colonies of *Sclerotinia sclerotiorum* and strong antagonism of *Trichoderma* spp. against *S. sclerotiorum* have been reported by many workers (Lee and Wu, 1979; Singh, 1998). The formation of inhibition zone by *T. viride* against *A. solani* in the present study suggests the involvement of strong antibiosis, possibly due to production of some diffusible substances. Various volatile metabolites viz., derivatives of lactones, alcohols and terpens etc., produced by *T. viride* (Zeppa et al., 1990), and chemicals like gliotoxin and gliovirin etc. produced by *Gliocladium* sp. are reported to be responsible for the formation of inhibition zone (Wilhite et al., 1994; Howell and Stipanovic, 1995). Similar observations with regard to *Trichoderma* spp. and *T. virens* have been made by Elad et al. (1980), Tu (1980) and Tu and Vartaja (1981). The present findings are also in conformity with that of Munshi (1998) and Munshi and Dar (2004) who noticed the formation of inhibition zone by *Gliocladium* sp. against *Fusarium pallidoroseum. T. viride* and *T. harzianum* have also been reported to be effective fungal antagonists against *Sclerotium rolfsii* (Alice et al., 1998) and *Rhizoctonia solani* (Roy, 1977; Elad et al., 1980; Gokulapalan and Nair, 1984).

Though, use of chemicals fungicides showed high level of control with instant result against *A. solani,* yet the efficacy of botanical and biocontrol agents do perform significantly better as a ecofriendly and safe products. This suggest that the opportunity to exploit the performance of non chemical against the disease causing pathogen *A. solani.* Thus, this method of control can contribute to minimizing the risks and hazards of toxic fungicides, especially on vegetables produced for fresh consumption. Further research into these extracts will identify the active compounds responsible for their fungicidal activity.

REFERENCES

Akhtar, K. P., Sarwar, N., Saleem, M. Y., and Asghar, M. (2011). Convolvulus arvensis, a new host for Alternaria solani causing early blight of Solanum lycopersicum in Pakistan. *Australasian Plant Diseases Notes,* 10, 1–3.

Alice D, Ramamorthy V, Muthusamy M, Seetharaman K (1998). Biological control of Jasmine wilt incited by Sclerotium rolfsii. *Indian J. Plant Protect.* 26:91-95.

Arunakumara, KT, Kulkarni, MS; Thammaiah, N. and Hegde, Yashoda (2010). Fungicidal management of early blight of tomato. *Indian Phytopathology*. 63 (1): 96-97.

Basseler AK and Hausladen SP (2003). Effect of some fungicides on infection of tomato with leaf mold, dnd early blight. *Arab J. PI. Prot.* 7(2): 126-132.

Chaerani, R., & Voorrips, R. E. (2006). Tomato early blight (Alternaria solani): the pathogen, genetics, and breeding for resistance. *General Plant Pathology,* 72, 335–347.

Choulwar AB and Datar VV (1988). Cost linked spray scheduling for the management of tomato early blight. I*ndian Phytopathol.* 41(4):603-606.

Datar, V. V. and Mayee, C. D. 1985. Chemical management of early blight of tomato. *J. Maharashtra Agric. Univ.* 10(3): 278-280.

Elad Y, Chet I, Katan J (1980). Trichoderma harzianum, a biocontrol agent effective against Sclerotium rolfsii and Rhizoctonia solani. P*hytopathology* 70: 119-121.

Ganie, S.A.; Ghani, M.Y.; Nissar, Qazi and Rehman, Shabir-u (2013). Bioefficacy of plant extracts and biocontrol agents against Alternaria solani. *African Journal of Microbiology Research.* 7 (34): 4397-4402

Howell CR, Stipanovic RD (1995). Mechanism in the biocontrol of Rhizoctonia solani induced cotton seedling disease by Gliocladium virens : antibiosis. *Phytopathology* 85: 469-471.

Kumar, Virendra; Gupta, RC; Singh, PC; Pandey, KK; Kumar, Rajesh; Rai AS, and Rai Mathura (2007). Management of early blight disease of tomato Cv. Kashi Amrit through fungicides, bioagents and cultural practices in *India. Vegetable Science.* 34(2): 206-207.

Latha P., Anand T., Ragupathi N., Prakasam V., Samiyappan R. (2009): Antimicrobial activity of plant extracts and induction of systemic resistance in tomato plants by mixtures of PGPR strains and Zimmu leaf extract against Alternaria solani. *Biological Control,* 50: 85–93

Lee YA, Wu WS (1979). Memories of the College of Agriculture, National Taiwan University 19(1): 96-107.

Lodha PC (1977) Reaction of some tomato cultivars to culture filtrate of A. solani. *Phytopathologia Mediterranea* 16: 36-37.

Maheshwari SK, Gupta PC, Gandhi SK (1991). Evaluation of different fungitoxicants against early blight of tomato (Lycopersicon esculentum Mill). *Agricultural Science Digest Karnal* 11(4): 201-202.

Mathur, K., and Shekhawat, K.S. (1986). Chemical control of early blight in Kharif sown tomato. *Indian Journal of Mycology and Plant Pathology,* 16, 235-236.

Morton, D.T. and Stroube, N.H. (1955). Antagonistic and stimulatory effects of microorganisms upon Sclerotium rolfsii. *Phytopathology.* 45: 419-420.

Mukhopadhyay AN (1994). Biocontrol of soil borne fungal plant pathogens. Current status, future prospects and potential limitations. *Indian Phytopathology* 33: 1-14.

Munshi NA (1998). Studies on the Fusarial blight of mulberry. Ph.D. thesis, SKUAST, J&K, Srinagar, pp. 1-198.

Munshi NA, Dar GH (2004). In vitro evaluation of some locally isolated microfungi for antagonism against mulberry Fusarial blight pathogen *(Fusarium pallidoroseum* (Cook.) Saac.). *Sercologia* (In press).

Neergaard, P. (1945). Danish species of *Alternaria* and *Stemphtlium.* Taxonomy, parasitism, economical signification. Copenhagen: Munksgaard, OxfordUniversity Press.

Pandey KK and Pandey PK (2003) Survey and surveillance of vegetable growing area for prevalence of major diseases in this region. *Vegetable Science.* 30: 128-134.

Pandey KK, Pandey PK, and Satpathy S(2002). Integrated management of disease, and insects of tomato, chill i, and cole crops. *Tech. Bull.* 9: 7.

Patil MJ, key SP and Raut BT (2003). Evaluation of fungicides, ,wd botanicals for the management of early blight (A. solani) of tomato. *PKV Res. J.* 25(1): 49-51.

Rotem, J. (1994). The genus *Alternaria.* St. Paul: APS Press.

Roy AK (1977). Parasitic activity of Trichoderma viride on sheath blight fungus of rice. *J. Plant Disease Protect.* 84: 675-683.

Rudresh DL, Shivaprakash MK, Prasad RD (2005). Potential of Trichoderma spp. as bio control agents of pathogens involved in wilt complex of chickpea. *J. Biol. Control* 19:157-166.

Sahu, D. K.; Khare, C.P.; Singh, H. K. and Thakur, MP (2013). Evaluation of newer fungicide for management of early blight of tomato in Chhattisgarh. *The Bioscan.* 8 (4): 1255-1259.

Sallam M.A.; Nas, hwa; Kamal, A.M; Elyousr, Abo (2012). Evaluation of Various Plant Extracts against the Early Blight Disease of Tomato Plants under Greenhouse and Field Conditions. *Plant Protection Science.* 48 (2): 74–79

Schimitz, H. (1930). A suggested toximetric method for wood preservation. *Indus Engia, Chem, Analysis* Edition, 2 361-363.

Sherf, A. F., and MacNab, A. A. (1986). Vegetable diseases and their control. New York: Wiley.

Singh Y (1998). Biological control of Sclerotinia rot of rapseed and mustard caused by Sclerotinia sclerotiorum. *Plant Disease Res.* 13:144-146.

Tu JC (1980). Gliocladium virens: A destructive mycoparasite of Sclerotinia sclerotiorum. *Phytopathology* 70:670-674.

Tu JC, Vartaja V (1981). The effect of hypoparasite (Gliocladium virens) on Rhizoctonia solani on Rhizoctonia root rot of white beans. *Canad. J. Bot*. 59:22-27.

Van der Waals, J. E., Korsten, L., and Slippers, B. (2004). Genetic diversity among Alternaria solani isolates from potatoes in South Africa. *Plant Disease,* 88(9), 959–964.

Wilhite SE, Lumesden RD, Strayney DC (1994). Mutational analysis of gliotoxin production by the biocontrol fungus Gliocladium virens in relation to suppression of Pythium damping off. *Phytopathology* 84:816-821.

Zeppa G, Allegrone G, Barbeni M, Gaurda PA (1990). Variability in the production of metabolities by Trichoderma viride. Annali di Microbiologia ed. Enzymologia. *Rev. Plant Pathol.* 70: 4735; 90:171-176.

Journal of Natural Resource and Development 9 (2) : 13-18 , 2014

EFFECT OF RHIZOBIUM SOIL INOCULATION AND MOLYBDENUM ON GROWTH AND YIELD OF PEA (*PISUM SATIVUM* L.) CV RACHNA

SURYA NARAYAN
Kulbhasker Ashram Post Graduate College, Allahabad, (U.P.) India

Received : 27.09.2014 *Accepted : 15.11.2014*

ABSTRACT

According to result it was concluded that the biometric characters like plant height (64.67cm), number of primary branch per plant (19.80),days to flowering (43.80), total dry matter accumulation/ plant (675.74g), pod length (10.13cm.), pod girth (32.00mm), number of pods per plant (68.33), number of seeds per pod (7.33), fresh weight of seeds/ plant (369.67g) and pod yield per plant (455.76g) were higher at higher level of inoculum (30 q/ha) along with 5kg/ha molybdenum. The growth and yield characters were better with rhizobia and molybdenum treatment. The interaction effect of rhizobium soil inoculation and molybdenum levels were also significant on plant height, total dry matter accumulation , days to flowering, pod length, fresh weight of seed per plant, yield per plant and pod yield/ha.

Keywords : Pea, yield, Rhizobium, soil inoculation and molybdenum,pod, plant growth.

Pea plays a substantial role by serving as a vegetable crop mainly for the rural people in east, west, south and central parts of Africa (Mortomore et.al., 1997). Pea used at all stages of its growth including as a vegetable crop (Offori and Stem, 1986). Pea variety Rachna is amoderate vigour type. Pods are thick, light green long round and highly curved. Yield potential of Rachna 10t/ha. The optimum fertilization is an important parameter for increasing the crop productivity and provides the plants with the best environment to express its capacity fully under the given conditions. The optimum plant nutrition with proper inoculation provides quality yield with sustainable manner. Vegetable pea is a good source of sugar, protein and minerals. High productivity of pea crop had always remained a limiting factor. Rhizobium sp is a root. nodulating bacteria of pea plant which fixed atmospheric nitrogen for plant nutrition.

MATERIALS AND METHODS

A field experiment was conducted at the Deptt. Horticulture K.A.P.G. College in the year 2013. The experimental site had loam with pH 6.86, EC of 0.02 ds /m, 6.45 % organic carbon with 632, 34.5, 242.5 kg of N.P.K. per/ha

respectively. The experiment was laid out in factorial randomized block design with three replications. There were twelve treatments combinations comprised of three levels of inoculation (10, 20 and 30 q/ha inoculated FYM used during sowing time) designated as R1, R2 and R3 and four levels of Molybdenum (0, 5, 10 and 15 kg /ha as ammonium molybdate mixed in10 quintal FYM and applied in furrow at sowing) designated as M0, M1,M2 and M3. The seeds were treated with captan @ 3g/kg seeds before sowing against wilt. The seeds were sown on 15th November 2013 at 30 x 10 cm spacing. The nitrogen @ 20kg//ha, potassium @10 kg/ha and phosphorous @ 20 kg/ha as were applied during the crop period .A sample of five plants was taken randomly from central rows in each experimental plot at different intervals. The growth parameters like plant height, number of primary branches, dry matter accumulation, days to flowering and days to first picking were recorded. Similarly the yield and its attributes were recorded for estimating total dry matter accumulation, each sample was first air dried and later oven dried at 60^0C to constant weight. The sum of dry weights of all plant parts was taken as total dry matters accumulation per plant (g).

RESULTS AND DISCUSSION

The result revealed that the effect of of rhizobium soil inoculation and molybdenum levels on vegetative growth performance and yield were significant. The plant height increased with increasing concentration of rhizobia and increased number of primary branches per plant at all sampling occasions. Higher level of rhizobia produced vigours and

Table.1 Effect of rhizobium soil inoculation and molybdenum levels on plant height, number of primary branches/plant and days to flowering of pea (*Pisum sativum* L.) CV RACHNA.

Plant height(cm) (At 60 DAS)						No. of primary branches (At45DAS)					Days to flowering(Days)				
Rhizobium inoculation level						Molybdenum levels									
	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean
R1	55.60	57.93	51.67	50.00	53.75	18.07	18.53	17. 60	16.87	17.52	46.67	46.00	46.53	46.47	46.50
R2	55.40	58.40	52.07	51.40	54.82	18.00	18.33	17.13	16.33	17.20	45.47	45.40	45.33	45.27	45.37
R3	59.20	64.67	52.40	51.80	55.47	17.47	19.80	17.07	16.07	17.85	45.00	43.80	44.63	45.47	44.73
Mean	56.74	57.67	52.14	51.30		17.84	18.22	17.27	16.42		45.71	45.30	45.50	45.60	

Source	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)
Rhizobium level(R)	0.12	0.34	0.11	0.31	0.06	0.18
Molybdenum Levels (M)	0.13	0.39	0.12	0.36	0.07	0.20
RxM	0.23	0.68	0.21	NS	0.12	NS

Table.2 Effect of rhizobium soil inoculation and molybdenum levels on total dry matter accumulation of. pea (Pisum sativum L.) CV RACHNA.

Total dry matter accumulation						Total dry matter accumulation (60DAS)					Total dry matter accumulation (90DAS)				
Rhizobium inoculation level	Molybdenum Levels					Molybdenum Levels									
	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean
R1	163.50	219.03	174.85	160.38	171.94	245.66	374.37	281.67	167.67	189.40	488.40	658.77	410.64	367.50	416.33
R2	172.91	237.81	179.64	167.97	177.08	265.17	370.67	274.28	164.28	199.41	474.41	665.98	486.92	396.85	461.04
R3	187.95	270.96	193.70	141.33	205.40	251.19	383.51	264.43	154.43	245.81	422.81	675.74	406.08	303.51	568.04
Mean	174.79	245.93	179.96	159.89		254.00	376.28	266.79	166.79	256.21	495.21	660.17	459.21	355.95	

Source	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)
Rhizobium level(R)	0.12	0.34	0.11	0.31	0.06	0.18
Molybdenum Levels (M)	0.13	0.39	0.12	0.36	0.07	0.20
RxM	0.23	0.68	0.21	NS	0.12	NS

Table 3.Effect of rhizobium soil inoculation and molybdenum levels on number of pods per plant, pod weight/plant and pod yield/ plant of pea (Pisum sativum L.) CV RACHNA.

Pod length(cm)						Pod girth(mm)					No. of pods per plant				
Rhizobium inoculation level	Molybdenum Levels														
	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean	Mo	M1	M2	M3	Mean
R1	8.47	8.80	7.83	6.13	7.31	30.87	32.00	30.27	23.27	30.35	45.13	66.47	46.47	45.33	46.85
R2	8.53	9.40	7.67	6.53	8.78	30.33	33.13	30.53	22.00	31.25	45.13	66.07	46.00	45.67	46.47
R3	6.80	10.13	7.33	6.27	9.63	30.93	34.27	32.00	22.07	31.57	45.33	68.33	46.07	45.93	46.87
Mean	7.63	9.44	7.61	6.98		30.38	32.13	30.27	22.44		45.13	65.96	46.84	45.64	

Source	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)
Rhizobium level(R)	0.12	0.34	0.22	0.65	0.12	0.36
Molybdenum Levels (M)	0.13	0.39	0.26	0.26	0.14	0.42
RxM	0.23	0.68	0.44	NS	0.25	NS

Table 4. Effect of rhizobium soil inoculation and molybdenum level on number of seeds/pod, fresh weight of seeds/plant and pod yield/ plant of pea (Pisum sativum L.) CV RACHNA.

No. of seeds per pod						Fresh Seed weight per plant(g)					Pod yield per plant(g)				
Rhizobium level						Molybdenum Levels									
	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean	M0	M1	M2	M3	Mean
R1	5.13	6.47	4.47	3.33	5.34	209.60	310.50	111.70	110.93	142.93	389.23	401.82	205.16	111.17	201.85
R2	5.13	6.07	4.00	3.67	5.47	209.57	310.20	111.40	110.00	149.79	352.78	400.82	257.47	160.76	256.71
R3	5.13	7.33	4.07	3.93	5.87	209.60	369.67	109.83	110.20	176.83	396.93	455.76	208.20	116.68	206.39
Mean	5.13	6.96	4.84	3.64		209.59	310.12	110.98	110.38		346.31	423.80	256.94	162.87	

Source	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)	SEm±	CD(P=0.05)
Rhizobium level(R)	0.12	0.36	0.06	0.17	0.54	1.59
Molybdenum Levels (M)	0.13	0.42	0.07	0.20	0.63	1.84
RxM	0.23	NS	0.12	0.35	1.09	3.19

The data were analyzed as per the method described by Panse and Sukhatme (1985).

spread of plants. Significant increase in plant height with high level of rhizobia (30q /ha) might be due to quick completition of mineralization of complex source of plant nutrition. These microbes also provide additional nitrogen being fixed by bacteria. Rhizosphere of plant also improved for better nutrient and water translocation. Increased molybdenum limits the availability of other essential nutrient and proved antagonistic to vigour and yield of plant. This also modified root configuration affecting the crop growth. Molybdenum is essential to root nodulating bacteria. Higher concentration of molybdenum had adverse effect on growth and yield of plant. These findings were in conformity with Khurana et.al.(1990) and Ahuja (1994). Increased plant height was noticed by Ahmed et.al. in 2010.

The TDM accumulation was higher with higher level of rhizobium soil inoculation (30 q/ha). The result might be attributed to optimum use of natural resources, higher uptake of nutrients and more number of roots per unit area. Beneficial effect of optimum level of molybdenum on total dry matter accumulation has also been reported by Dwivedi et al. (1994) in French bean. Though the number of primary branches per plant, pod length, pod girth, number of pods per plant were higher at lower concentration of molybdenum (5 kg /ha). It delayed the maturity. Higher photosynthesis and higher amount of dry matter assimilation due to higher number of leaves and higher availability of nutrients led to vegetative growth at a longer period as such the reproductive phase was delayed (Honma and Bert, 1977).

The higher pod yield per plant at low molybdenum level (5kg/ha) could be attributed to the significant increase in pod length, pod girth, number of pods per plant, number of seeds per pod and pod weight per plant. These values were significantly lower at higher level of molybdenum (10 and15kg/ha) due to increased lethal effect on the plants for the mobilization of nutrients. Increasing molybdenum concentration directly decreased the number of pods per plant. This reduction may be attributed to the antagonistic effect among essential nutritients. The findings are in accord with the previous results reported by Weber et al. (1996) and Hamad (2004). The variations in number of pods per plant could be attributed to the variation in number of branches per plant. Hence lower level of molybdenum resulted in maximum number of branches per plant and in turn was responsible for more number of fruiting points. Further, less competition for light, moisture and nutrients associated with wider spacing has an edge in producing more reproductive parts compared to higher concentration.

The plants growth, yield and its attributes were superior with the application of rhizobia 30q/ha. Increase in plant growth might be due to hastened meristematic activity, better root growth and better absorption of nutrients by

increased application of rhizobia (Philip, 1993). The translocation of Photosynthates by the action of rhizobia also showed in improvement in various growth parameters (Verma and Saxena, 1995). Increased nodulation implies greater symbiotic fixation of atmospheric N which also helps in cell division and root extension which might have resulted in vigorous plant growth. Similar results were reported by Joseph and Varma (1994) in chickpea.

The rhizobia culture application @ 30q/ha showed a significant improvement on days to flowering, days to 50 per cent flowering and days to first picking. Influence of rhizobia in hastening maturity is well documented. Rhizobia impart quicker vegetative growth to the plant and entering into the reproductive phase early. The same trends of higher levels of rhizobia were also noted by Philip (1993) in cowpea and Bahadur and Singh (1990) in garden pea. The increase in yield attributes might be a direct consequence of growth characters. Adequate supply of . Rhizobia level is important in the laying down the primordial for the reproductive parts of plants. It is also considered important in the formation of pods and seeds. Nitrogen being a constituent of protoplasm, which may be responsible for increased length of pods, pod weight, number of seeds per pod and inturn pod yield. These results are in conformity with the finding of Sundara et al. (2004) in pea.

The interaction effect of application of rhizobia @30q/ha and lower level of molybdenum (5kg/ha) produced higher pod yield along with rich protein content. The economic returns were more in this interaction (R3M1) as per the results obtained in the present experiment. It is also suggested that a rhizobia level R_3 (30q /ha) and (5kg/ha) molybdenum was most profitable for the cultivation of vegetable pea cv. Rachna under irrigated conditions in Allahabad area.

REFERENCES

Ahmed, N.M.E. and Abdelrhim, J.A. (2010). Effect of plant density and cultivar on growth and yield of cowpea (*Vigna unguicuiata* L. Walp). Australian *J. Basic Appl. Sci.* 4(8): 3148-3153.

Ahuja ,K.N. (1994). Response of pigeonpea (*Cajanus sp.* (L.) Mill) to plant density and phosphate fertilization. *India J. Agron.* 24 (2) : 237-239.

Bahudur, V. and Singh, T. (1990). Yield and growth response of garden pea (*Pisum sativum* L.) to nitrogen and phosphorus application. *Veg. Sci*.17 : 205-209.

Dwivedi, D.K., Singh, H., Shahi, K.M.B. and Rai, J.N. (1994). Response of frenchbean (*Phaseolus vulgaris)* to population densities and nitrogen levels under mid-upland situation in north-east alluvial plains of Bihar, Indian J. Argon 39(4) : 581-583.

Hamad, M.S. (2004). Effect of planting density on the performance of three cultivars of cowpea. M Sc. Thesis submitted to University of Khartoum, Sudan.

Honma, S. and Bert, J. (1977). Growing high density cauliflower. *Ameri. Veg.*

*Grower*25 (5) : 40.

Joseph, B. and Verma,K. (1994). Response of rain fed chickpea (*Cicer arietinumL.*) to jalshakti incorporation and phosphorus and sulphur fertilization. *Indian J. Argon* 39 (2) : 312-314.

Khurana, D.S., Singh, Harjit., Singh, Jamail and Cheema, D.S. (1990). Effect of N P and plant population on yield and its components in cauliflower. *Indian J. Hort.* 47 (1) : 70-78.

Mortimore, M.J., Singh, B.B., Harris, F. and Blade, S.F. (1997). Cowpea in traditional cropping systems. Advances in Cowpea Research. *IITA and JIRCAS*, Hong, pp: 99-113.

Offori, F. and stem, W.R. (1986). Maize/cowpea intercrops system: Effect of nitrogen fertilizer on productivity and efficiency. *Field Crop Res.* 14: 247-261.

Panse, V.G. and Sukhatame ,P.V. (1985). Statistical methods for agriculture workers. ICAR, New Delhi.

Philip, .A (1993) Phosphorus and molybdenum nutrition in cowpea (*Vigna unguiculata L.*) M. Sc. (A.G.) Thesis submitted to the Kerala Agricultural University.

Sundara, T.H., Vyakaranahal, B.S., Shekhargoud, M., Shishidhara, S.D. and Hosamani, R.M. (2004). Influence of phosphorus and micronutrients on seed yield and quality of pea *(Pisum sativum* L.*) Seed Res*. 32 (2): 214-2.6.

Verma ,V.S. and Saxena, K.K. (1995). Response of Frenchbean (*Phaseolus vulgaris*) to graded doses of nitrogen, phosphorus and potassium in silty loam soil of central Uttar Pradesh. *Indian J. Agron*. 40 (1): 67-71.

Weber, C.R., Shibles, R.M. and Byth, D.E. (1996). Effect of plant population and row spacing on soybean development and production. *American Society of Agronomy Journal*, Madison, USA 58:99-102.

Journal of Natural Resource and Development 9 (2) : 19-21 , 2014

STUDIES ON FISH BIO-DIVERSITY OF THE GANGA RIVER SYSTEM AT ALLAHABAD

P. R. Singh
Department of Zoology, University of Allahabad (U.P.), India

Received : 09.10.2014 *Accepted : 26.11.2014*

ABSTRACT

Ganga river system is considered as most important source of valuable indigenous fishes. Due to diversity in its environment and other qualities this system is natural home of a large number of valuable animal and plant species. During sixties and seventies various fish species have been recorded. Valuable indigenous major Carps like Labeo rohita, Catla catla, Cirrhinus mrigala dominated the fish catch in river Ganga and its tributaries. Catfishes were mainly represented by Aorichthys aor, Aorichthys seenghala, Rita rita and Bagarius bagarius etc. Aproximately Three hundred fish species were reported from the riverine system. Singh et al (1998) reported a major Change in the riverine fisheries due to environmental Changes in the river Ganga. Among the major Carps the upsurge of Labeo Calbasu fishery was reported and all other indigenous major carps like Labeo rohita, Cirrhinus mrigala, Catla Catla showed declining trend. In the present investigation it was observed that the catch of indigenous major carps have become negligible. Catfishes like Aorichthys aor, A. seenghala, A. Cavassius A. Vittatus, Clupisoma garua, Eutropiichthys Vacha, Rita rita, Bagarius bagarius, etc. were frequently recorded and catch was dominated by trash fishes. After a careful record it was observed that fish diversity in the Ganga river system in Allahabad region has declined and approximately seventy fish species were recorded. During the period of observations this was most important that few exotic fish species like Cyprinus Carpio, Oreochromis species, Tilapia species etc. have entered in the natural riverne system and their increasing occurrence in Ganga and Yamuna rivers may create catastrophic conditions and fisheries may change to a great extent.

Key Words: Ganga river, major carps, biodiversity, fisheries, fish species.

Rivers are lifeline for living beings, different types of developmental activities are related to rivers. Rivers have played important role in the development of human civilization as they provide water, food, building materials, employment, energy, tourism spots etc. But recently due to population explosion and

industrial developments rivernine fishery has considerably suffered. Ganga river system is the most important river system in India is well known for indigenous fish biodiversity. Jhingran (1970) reported several aspects related to fishery of several important fishes. Dominance and importance of major carps and certain catfishes are well discussed. Gupta and Tyagi (1992) and Singh et al (1998) have observed the Changing Scenario of riverine fisheries of the Ganga river system.

There is no record for entry and dominance of exotic fishes in the Ganga river system. During present observation common carp, tilapia, silver carp etc. were recorded in the Ganga and Yamuna rivers at Sadiapur, Gaughat (River Yamuna), Daraganj and Shivkuti (River Ganga) which may crate a dangerous situation for valuable indigenous fish species.

MATERIALS AND METHODS

For the identification of different fish species and confirmation of occurrence of different fishes a number of fish landing stations were selected. These landing stations are Mehdauri, Rasoolabad, Shivkuti, Daragnaj on the river bank of Ganga), Gaughat, Sadiapur (River Yamuna). During early morning 6 AM to 8 AM starting from January 2002 to December 2002 the fish landing stations were visited and different fish species were recorded. Doubtful fish species were confirmed by identification Keys described by Day (1978), Jayram (1981) Srivastava (1992).

RESULTS AND DISCUSSION

On the basis of morphological and meristic characters different fish species were identified and doubtful fishes were collected from the landing sites and were fixed in 8% formalin for examination in the laboratory.

Few Exotic Fishes Like Cybrinus, Carpio, Oreochromis mossambicus, Oreochromis nilotica, Hypophtulmichthys molitrix have entered in the Ganga river system at Allahabad. Thus it is clear that fish diversely is showing a declining trend. Few specimens of Hilsa ilisha is available during flood conditions only. Major carps have almost disappeared from the riverine environment. Thus due to anthropogenic threats and invasive exotic fish species the fish bio-diversity is declining and in future the major Carps and other valuable fish species will be available only in books and stories.

S.N.	Name of the fish species	Family
1.	Chela atpar	Cyprinidae
2.	Chela laubuca	" "
3.	Cirrhinus mrigala	" "
4.	Cirrhunus reba	" "
5.	Crossocheilus latus	" "
6.	Labeo bata	" "
7.	Labeo rohita	" "
8.	Catla Catla	" "
9.	Aspidoparia morar	" "
10.	Puntius Chola	" "
11.	Puntius sarana	" "

S.N.	Name of the fish species	Family
12.	Puntius sophore	" "
13.	Puntius ticto	" "
14.	Oxygaster bacoila	" "
15.	Oxygaster gora	" "
16.	Osteobrama Cotio	" "
17.	Rasbora daniconius	" "
18.	Botia dario	Cobitidae
19.	Ompok bimaculatus	Siluridae
20.	Wallago attu	"
21.	Aorichthys aor	Bagridae
22.	Aorichthys seenshala	"
23.	Aorichthys Cavassius	" "
24.	Aorichthys vittatus	"
25.	Aorichthys tengra	"
26.	Rita rita	"
27.	Bagarius bagarius	Sisoridae
28.	Gagata Cenia	"
29.	Glyptothorax telchitta	"
30.	Ailia Coila	Schilbeidae
31.	Clupisoma garua	"
32.	Eutropiichthys vacha	"
33.	Pangasius pangasius	Schilbeidae
34.	Silonia silondia	"
35.	Heteropheustes fossilis	Saccobranchidae
36.	Clarias batrachus	Clariidae
37.	Xenentodon Cancila	Belonidae
38.	Rhinomugil Corsula	Mugilidae
39.	Sicamugil Cascasia	"
40.	Channa gachua	Ophiocephalidae
41.	Channa marulius	"
42.	Channa punctatus	"
43.	Channa striatus	"
44.	Chanda nama	Centropomidae
45.	Chanda ranga	"
46.	Sciana Coitor	Sciaenidae
47.	Badis badis	Nandidae
48.	Nandus nandus	"
49.	Anabas testudineus	Anabantidae
50.	Colisa Chuna	"
51.	Colisa faciatus	"
52.	Glossogobius giuris	Gobiidae
53.	Masta cembelus armatus	Mastacembelidae
54.	Mastacembelus puncalus	"
55.	Tetraodon cutcutia	Tetrodontidae
56.	Gadusia Chapra	Clupeidae
57.	Gadusia godanahiai	"
58.	Hilsa ilsha	"
59.	Gonialosa monmina	"
60.	Setipinna phasa	Engraulidae
61.	Notopterus notopterus	Notopteridae
62.	Notopterus Chitala	"
63.	Amblypharyngodon miscrolepis	Cyprinidae
64.	Aspidoparia morar	"
65.	Aspidoparia mola	"

ACKNOWLEDGEMENT

Author is thankful to MRAG (Marine Resources Assessment Group) Ltd., London, United Kingdom for financial assistance.

REFERENCES

Jhingran, U.G. (1970). Fisheries of the Ganga river system, quoted from Fish and Fisheries of India. Hindustan Publishing Corporation, Delhi.

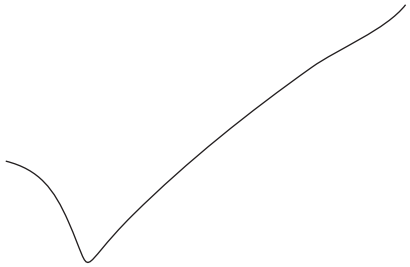
Gupta, R.A. and R.K. Tyagi (1992) Analytical approach to analysis of fish stocks of the Ganga river system. J. Inland Fish. Soc. India, 24,20-27.

Day, F. (1889). The Fauna of British India including Ceylon and Burma fishes Vol. 1 and 2.

Jayram, K.C. (1981). The Fresh water Fishes of India, Pakistan, Bangladesh, Burma and Srilanka. Handbook, Aurbindo Press Kolkata.

Srivastava Gopal Ji (1992). Fishes of U.P. and Bihar. Vishwavidyalaya Prakashan Varanasi.

Singh, H.R., Payne A.I., Pandey, S.K. and P.R. Singh (1998). Time Scale changes in the catch structure of fishery in Allahabad. Proc. Nat. Acad. Sc. India 66(B) 15-21.



Journal of Natural Resource and Development 9 (2) : 22-32 , 2014

EFFECT OF PHYSIOCHEMICAL AND BIOLOGICAL ASPECTS ON TAP WATER, HAND PUMP WATER AND DIFFERENT GHATS OF POLLUTED WATER IN ALLAHABAD AND VARANASI WITH SPECIAL REFERENCE TO FISHES AND HUMAN HEALTH

Hemlata Pant*, Chanchala Pandey , Vivek Kumar Srivastava*** and Rakesh Kumar Yadav******

*Society of Biological Sciences and Rural Development, Jhusi, Allahabad (U.P.), India

**Department of Ecology and Environment, Sikkim Manipal University, Extension Centre, New Delhi.

***Department of Agriculture Entomology and Zoology, Kulbhaskar Ashram P.G. College, Alld. (U.P.), India

****Department of Agriculture Botany, Kulbhaskar Ashram P.G. College, Allahabad (U.P.), India

Received : 09.05.2014 *Accepted : 28.07.2014*

ABSTRACT

Studies on effect of physiochemical and biological aspects on tap water, hand pump water and different ghats viz. Rasulabad, Teliarganj, Sankerghat, Northern institute of printing technology, New Mehdauri and Jhusi ghat, Rasulabad ghat, Naini ghat, Sangam ghat, Balua ghat, Saraswatighat, Gaughat, Daraganjghat, Manikanka ghat and Harischandra ghat of polluted water in Allahabad and Varanasi were conducted. On the basis of findings it may be concluded that tap water of Rasulabad place was found clean of human and animal health followed by Sangam ghat and Teliarganj place. In case of hand pump condition water of Teliarganj followed by Rasulabad and Shankerghat were found clean for human and animal health. In case of different ghats the water of Sangamghat was found very clean for the use of human beings, animals and fishes followed by Naini ghat, Saraswati ghat and Baluaghat. Most polluted ghats were observed viz. Manikankaghat and Harishchandra ghats at Varanasi and Daraaganj ghat at Allahabad. Maximum harmful fungi, bacteria, phytoplankton and heavy matals also recorded in Manikanka ghat followed by Harishchandra ghat and Daraganj ghat. The water of Northern regional institute of printing technology place followed by New Mehdauri Place (in both tap and hand pump water condition) was found doubtful.

Keywords: Water, physio-chemical, biological, ghats.

Water is used in biochemical and chemical reactions and in downstream processing for product purification in industries. Also, it is the heat transfer medium for both heating and cooling. So, everybody used water and makes water polluted. The quality of life depends largely on the quality and purity of water available. Availability of good

quality pure water not only concerns individuals in their domestic daily life and reaction but it is also vital to industry and irrigated agriculture. The total volume of natural water on earth is about 1400-milion km^3. Its weight is nearly 1018 mk tones. In minimal as for as possible. The presence in concentrations higher than normal in natural water ways (lakes, river and oceans) of dissolved or suspended polluted like silts, chemicals, faecal matters, metallic elements, organic materials/nutrients or oil spills may cause disturbances/ disruption due to pollution in aquatic transport system by eutrophication, dissolved oxygen depletion followed by death of aquatic life, fire hazards etc.

Water quality of major river system is getting rapidly degraded due to large discharge of industrial wastes, domestic sewage, fly ash, mine discharges, oils, radioactive materials etc. The use of pesticides and insecticides at a large scale reach water either by direct application or indirectly. The direct application of pesticides may be to kill the undesirable fish in order to restock more desirable fish where as indirect sources include run off from agricultural fields spray drifts, rainwater sewage and effluents from industries manufacturing pesticides or using them in their process.

Since water pollution is caused by the activity of man. It occurs to the greatest extent were the urban population is growing rapidly. In, India, precipitation is high during the rainy season and since much of the water cannot be economically stored it passes to the oceans, causing erosion. Urbanization and industrialization have created new pollution problem. Untreated or partly treated sewage from urban communities and sewage overflow from overloaded treatment plants are discharged in to reverse creating serious water pollution. In view of the above, the present investigation is undertaken.

MATERIALS AND METHODS

water samples were collected from the Jhusi ghat, Rasulabad ghat, Naini ghat, Sangam ghat, Hanshchandra ghat, Baluaghat, Sarswati ghat, Manikanka ghat, Gaughat and Daraganjghat. Five replicates of the each samples were collected at a time in a glass stoppered bottles between 8 to 10 a.m. from the sampling ghats.

Colour and odour of the different ghats were observed simply by naked eye and nose by seeing or smelling it. Temperature was recorded by celsius thermometer.

Electronic conductivity meter was used for the measurement of electrical conductance. An automatic oxygen analyser was used to analyse the Dissolve oxygen content (DO), pH, Turbidity and T.D.S. were determined by a compact electronic kit.

The fungi in the samples of waters were analysed by employing baiting technique. The percentage abundance of fungi was calculated as follows and expressed in terms of percent

baits developing fungal colonies.

Total coliforms were estimated by standard total coliform, MPN test (Anonymous 1985). The most possible number of coliform was calculated as follows:

$$Percentage\ abundance\ of\ \ fungi = \frac{Number\ of\ \ baits\ showing\ \ fungal\ colonies}{Total\ \ Number\ of\ \ baits\ used} x100$$

The density of aerobic and facultative bacteria was estimated by the standard plate count method. SPC was calculated as follows:

$$MPN/ml = \frac{Number\ of\ \ Positive\ tubes}{ML\ Sample\ in\ negative tubes\ x\ ml.\ sample in all tubes}$$

SPC/mL-Number of colonies in a dish X Dilution (10,100 or 1000).

Phytoplankton or the chlorophyll bearing suspended microscopic organisms consisting of algae in the samples of water estimated by directly concentrating them through sedimentation. The population of Phytoplankton in the sample was computes as followed:

$$\text{Phytoplankton no./mL} = \frac{A \times l}{L} \subset \frac{n}{V}$$

A = Phytoplankton per drop
V = Volume of drop (ml)
n = Volume of concentrated sample (ml)
L = Volume of original sample

The metals were analyzed by Atomic absorption spectrophotometer (AAS) as AAS method high attainable sensitivity for a wide range of elements and high selectivity for the analytic elements.

RESULTS AND DISCUSSION

Studies on pH, DO, turbidity TDS, conductivity, colour, odour, temp, different heavy metals and biological properties (Population of fungi, bacteria and phytoplanktons) in tap water, hand pump water and different ghats of the rivers around Allahabad and Varanasi were observed during winter season. Maximum pH was recorded in Rasulabad (6.76), followed by Shankarghat. (6.65), Teliarganj (6.58), New Mehdauri (6.46) and Northern regional institute of printing technology (6.01) in tap water condition. In hand pump water condition maximum pH was noted in the Teliarganj place (6.95) followed by Rasulabad (6.86), Shankarghat (6.82), New Mehdauri (6.75) and Northern regional institute of printing technology (6.00) Table-1. In case of different ghats, higher pH was observed in Manikankaghat (in Varanasi) (8.23) followed by Hanshchandra ghat (8.19) in Varanasi and Daraganj ghat in Allahabad (8.19), Rasulabad ghat (7.09), Gaughat (7.07), Jhusighat (7.04), Baluaghat (7.03), Saraswatighat (7.02) Nainighat (7.02) and Sangamghat (7.00) Table 1.1.

In Tap water condition pH value ranges between 6.01-6.76, in hand pump condition pH value ranges between 6.00-6.96 and in different ghats pH value ranges between 7.00-8.23. In Northern regional institute of printing

technology in both condition (tap as well as hand pump) pH value was 6.01 and 6.00, if the pH value showed less then 7.0, the solution becomes acid (acidic), so the water of this place was acidic whereas the value showed more than 7.0 then the solution is know as base (basic). The water of the Manikankaghat, Harishchandra ghat and Daraganjghat, Rasulabadghat, Gaughat were basic because due to fire and decomposition of dead body and release of ash and other raw materials in the water (Table 1.1). pH of the water increase by increasing the pollutant it was found the higher the pollution greater was pH.

Maximum dissolve oxygen was found in Teliarganj (7.0) followed by Rasulabad and Shankarghat (6.0), New Mehdauri (5.0) and Northern regional institute of printing technology (4.0)in tap water condition. In hand pump water condition higher DO was noted in Teliarganj and Raulabad (6.0), followed by Shankerghat, New mehdauri (5.0) and Northern regional institute of printing technology(4.0). In case of different ghats higher dissolve oxygen was recorded in Sangam ghat (12.00) followed by Jhusi (11.00), Nainighat (11.00), Baluaghat (11.00), Saraswatighat (11.00), Gaughat (11.00), Harishchandraghat (4.00), Manikankaghat (4.00) and Daraganjghat (5.00)

The value of dissolve oxygen (DO) was showed range between 4.0ml/1-7.0ml/g in tap water condition. In hand pump water condition the value of DO, was showed range between 4.00 ml/1 - 6.0 ml/l and in different ghats the value of DO was showed range between 4.00ml/l-12.00ml/l. The acceptable DO was found in different places of Allahabad viz Rasulabad, Teliarganj, Shankarghat (tap water condition) and Rasulabad, Teliarganj (hand Pump Water condition) and Sangam ghat, Jhusi ghat Rasulabad, Nainighat, Baluaghat, Gaughat and Saraswatighat in around Allahabad and Varanasi ghats. Remaining places viz. Northern regional institute of printing technology in both (tap water and hand pump water) condition and water of Manikankaghat and Harishchandra ghat of Varanasi were bad condition. The water was bad in condition, may be due to the decomposition of organic matters, industrial effluents, sewage and municipal wastes. (Table1.1). Similar observation made by Dwivedi and Pandey (1999).

Higher Turbidity was found in Teliarganj (14) followed by Rasulabad, (5), Shankarghat (5), New Mehdauri (4) and Northern regional institute of printing technology (03) in tap water condition. In hand pump water condition higher turbidity was found in Teliarganj (8), Shankarghat (8), followed by Rasulabad (6), Northern regional institute of printing technology (4) and New Mehdori (4). Maximum turbidity was noted different ghats viz. Manikankaghat (29.00) followed by Harishchandraghat (28.00), Daraganj ghat (25.50), Rasulabad ghat (13.00), Jhusi ghat (12.00) Gaughat (12.00), Baluaghat (10.00), Saraswatighat (8.00), Nainighat (8.00)

and Sangamghat (5.00). (TabIel.l)

Maximum Total dissolve salts (TDS) was found in Teliarganj (650), Rasulabad (550) followed by Shankarghat (450), New Mehdori (450), Northern regional institute of printing technology (400) in tap water condition. Higher TDS was recorded in Shankarghat (550) and Teliarganj (550). Minimum TDS was recorded in Northern regional institute of printing technology (450), New Mehdauri (450). In Rasulabad place T.D.S. was recorded (500) in Hand Pump condition.

In case of different ghats higher T.D.S was found in Manikankaghat (1300), Harishchandra ghat (950), Daraganj ghat (750), Jhusi ghat (450), Rasulabad ghat (450), Gaughat (450), Baluaghat (400), Naini ghat (350), Saraswati ghat (300) and Sangam ghat (250). TDS controls the turbidity of water and varied with season (table 1.1).

In case of Tap water maximum conductivity was found in Northern regional institute of printing technology (1180/1000) followed by Rasulabad (955/1000) New Mehdauri (918/1000), Shankarghat (890/1000) and Teliarganj (650/1000). In hand pump water condition higher conductivity was found in Northern regional institute of printing technology (1159/1000), Teliarganj (1020/1000), New Mehdauri (900/1000), Shankarghat (850/1000) and Rasulabad (760/1000). In case of different ghats higher conductivity was noted in Manikankaghat (1.42) followed by Gaughat (1.02), Harishchandra ghat (1.02), Baluaghat (0.14), Saraswati ghat (.13), Jhusi ghat (0.12), Naini ghat (0.12), Daraganj ghat (0.10), Sangam ghat (0.01) and Rasulabad ghat (0.01). The conductivity of water depend upon the concentration of ions and nutritional status. The season and pollutants affected the conductivity of water. The conductivity of polluted water varied. The conductivity of the water bodies varied with the season. Similar observation made by Garg et, al., (2005).

Light brown colour was observed in Jhusi ghat, Rasulabadghat, Sangamghat, Baluaghat, Saraswatighat and Gaughat. Dark Brown colour of water was found in Manikankaghat, Harishchandraghat and Daraganjghat. Slight odour recorded in Manikankaghat, Harishchandraghat and Daraganj ghat. All the other ghats were found odour less, higher temp of water was recorded in Manikankaghat (32.4°c) followed by Harishchandraghat (30.5°c), Daraganjghat (30.00), Saraswatighat (21.3), Sangamghat (23.1), Baluaghat (22.2), Nainighat (22.1), Rasulabadghat (22.0), Gaughat (20,3), Jhusi ghat (15.9). Temperature of water body increases by increasing the pollutant levels. Due to the pressure of pollution in the different ghats the colour was change in dark brown and slight odour was noted in Manikankaghat, Harishchandra ghat and in Daraganj ghat may be due to the fire of dead body, release and decomposition of ash of dead bodies and other organic matters. (Table-1.2).

Maximum fungi/bacteria Protozoa and Algae (Phytoplankton's) were found in Manikankaghat, Harishchandraghat and Daraganjghat it may be due to the relationship between organism and ecological factors can be used an indicator of environment pollution. Microorganisms are living catalysts that enable a vast number of chemical process to occur in water and soil. It was also observed that fungi and bacteria were increase with increasing the pollution level. Similar observation made by Singh and Bhowmick (1985) and Somashekar et. al. (1982). The most important function of fungi in environments in the breakdown of cellulose in wood and other plants materials. Although fungi do not grow well in water, while they play an important role in determining the composition of natural water and wastes because of the large amount of there decomposition products that enter water. Among various physiochemical parameters temp, pH, DO and nutrients level in the water bodies closely associated with presence of fungi Somashekar et. al. (1982). The metabolic activity of bacteria is greatly influenced by their small size, The total bacteria and population of coli forms also fluctuated with seasons and pollution status. Fluctuation in the population of bacteria in water bodies with season and pollution status has been earlier reported by Bilgrami et al (1983).

Biological properties of different ghats of rivers at around Allahabad and Varanasi showed that different fungi viz, *Ascobolus* sp, *Soprolegnia* sp. were found in Jhusi ghat of Ganga. In Rasulabadghat *Fusarium* sp. and *Achlya* sp. were present. *Mucor* sp. were noted in Naini ghat, Harishchandra ghat and Manikankaghat. *Fusarium* sp. were found in Naini ghat, Harishchandrasghat and Manikankaghat. *Phoma* sp. were observed in Harish Chandra ghat, Saraswatighat, Manikankaghat, Gaughat and Daraganjghat. In Jhusighat, Nainighat, Harishchandraghat, Baluaghat, Saraswatighat, Manikankaghat, Gaughat and Daraganjghat *Ascobolus* sp. was noted. *Soprolegnia* sp. was noted in Jhusighat, Manikankaghat, Gaughat and Daraganjghat . *Achlya* sp. was found in Rasulabadghat, Nainighat, Saraswatighat, Manikankaghat and Daraganjghat. In Sangamghat all the fungi were absent, (table 1.3) Somashekhar et. al. (1982).

Higher total coliforms were noted in Manikankaghat (92.30), Harishchandraghat (85.10), Daraganjghat (73.0), Jhusighat (49.0), Nainighat (47.2), Sangamghat (43.00), Baluaghat (42.0), Saraswatighat (41.0), Rasulabadghat (40.0) and Gaughat (40.0).

Maximum Bacteria were obtained in Manikankaghat (245.20), Harishchandra ghat (215.10), Daraganjghat (205.40), Baluaghat (200.30), Nainighat (180.20), and Rasulabadghat (157.10). In Jhusighat, Sangamghat and Saraswatighat Bacteria were absent (table 1.5) Singh, and Bhowmick (1985) and Bilgrami et, al. (1983).

Higher number of total population of Phytoplanktons were observed in

Manikankaghat (56), followed by Harishchandra ghat (42), Saraswati ghat and Jhusi ghat (10), Daraganjghat (9), Rasulabadghat (7) and Gaughat (7), Nainighat (6) and Sangamghat (3) (Table 1.4).

In the different ghats Pb were maximum in Manikankaghat (.0448mg-1) in Varanasi followed by Harishchandraghat (0.443mg-1), Daraganjghat (0.432 mg-1), Nainighat (0.432 mg-1) Jhusighat (0.408 mg-l), Rasulabadghat (0.412 mg-1), Saraswatighat (0.359 mg-l), Baluaghat (0.386 mg-1), Gaughat (0.342) and Sangamghat (0.342) (Table 1.6).

Data indicated that cromium in water sample of the different ghats were varied from 0.202-12.33 mg-1. The minimum concentrations were found at Sangam ghat (0.202) and maximum concentration were found in Manikankaghat (12.33 mg-1) at Varanasi followed by Harishchandraghat of Varanasi (7.013 mg-1), Daraganjghat of Allahabad (1.56 mg-1) and Jhusighat (0.299 mg-1) (Table 1.6.).

Cadmium concentration was highest (0.057 mg-1) at Manikankaghat followed by Harishchandraghat (0.055 mg -1), Daraganjghat (0.051 mg-1) at Allahabad respectively (table 1.7).

Heavy metals like lead Cromium and Cadmium were found maximum in Manikankaghat followed by Harishchandra-ghat and Daraganjghat may be due to industrial effluents of many industries, which are discharge in different ghats of rivers. They may produce toxic substances. The water also contents the toxic substance, which affected directly for health of human and fishes. (Tables 1.6) (Jetly. et., al (1999) and Ashvini Kumar et., al, 2005).

TABLE No-1: EFFECT OF pH, DO, TURBIDITY, TDS AND CONDUCTIVTY ON DRINKING WATER (TAP WATER AND HAND PUMP WATER)

Treatment	pH		DO mg/l		Turbidity		TDS (ppm)		Conductivity	
	Tap Water	Hand Pump Water	Tap Water	Hand Pump Water	Tap Water	Hand Pump Water	Tap Water	Hand Pump Water	Tap water	Hand Pump water
Rasulabad	6.76	6.86	6.0	6.0	5	6	550	500	0.95	0.76
Teliarganj	6.58	6.95	7.0	6.0	14	8	650	550	0.65	1.02
Shankerghat	6.65	6.82	6.0	5.0	5	8	450	550	0.89	0.85
Northern institute of printing technology	6.01	6	4.0	4.0	3	4	400	450	1.18	1.15
New Mehdauri	6.46	6.76	5.0	5.0	4	4	450	450	0.91	0.9

TABLE No - 1.1: EFFECT OF pH. DO. TURBIDITY, T.D.S AND CONDUCTIVITY ON THE DIFFERENT GHATS OF RIVERS AT ALLAHABAD AND VARANASI

Treatment	pH	DO mg/l	Turbidity	T.D.S (ppm)	conductivity mmho/cm
Jhusighat of river Ganga (G1)	7.04	11.00	12.00	450	0.12
Rasulbad ghat of river Ganga (G2)	7.09	10.00	13.00	450	0.01
Naini Ghat of river Yamuna (G3)	7.02	11.00	8.00	350	0.12
Sangam ghat (G4)	7	12.00	5.00	250	0.01
Harishchandra ghat of river Ganga (G5)	8.19	4.00	28.00	950	1.02
Balughat of river Yamuna (G6)	7.03	11.00	10.00	400	0.14
Saraswati ghat of river Yamuna (G7)	7.02	11.00	8.00	300	0.13
Manikankaghat of river Yamuna (G8)	8.23	4.00	29.00	1300	1.42
Gaughat of river Yamuna (G9)	7.07	11.00	12.00	450	1.02
Daraganj of river Ganga (G10)	8.19	5.00	25.50	750	0.1

TABLE No-1.4: BIOLOGICAL PROPERTIES OF DIFFERENT GHATS OF RIVERS AT AROUND ALLAHABAD AND VARANASI

S. No	Treatment	Population of Phytoplankton (Units/mt)											
		Cyanophyta			Chlorophyta				Bacillariophyta				
		Oscillatori	Microsystis	Anabaena	Synura	chlorella	Eudorina	Spirogyra	Diatoma	Navicula	Synedra	Pinnularia	
1.	Jhusighat of Gaga	1	-	-	2	-	1	2	3	-	1	-	10
2.	Rasulabad ghat of Ganga	-	-	1	-	-	2	1	2	-	1	-	7
3.	Naini Ghat of Yamuna	2	1	-	-	1	2	-	-	-	-	-	6
4.	Sangam ghat	-	-	-	1	-	-	1	-	-	1	-	3
5.	Harishchandra ghat of Ganga	1	7	2	3	-	-	4	-	2	11	12	42
6.	Baluaghat of Yamuna	1	-	4	-	2	-	-	-	-	-	-	7
7.	Saraswati ghat of Yamuna	2	1	-	-	3	-	1	-	-	2	1	10
8.	Manikankaghat of Yamuna	4	3	2	2	1	2	14	1	10	11	6	56
9.	Gaughat of Yamuna	-	-	1	-	2	-	3	-	-	1	-	7
10.	Daraganj of Ganga	1	2	-	-	2	3	1	-	-	-	-	9

TABLE No-1.2: PHYSIO-CHEMICAL PROPERTIES OF DIFFERENT GHATS OF RIVERS AT AROUND ALLAHABAD AND VARANASI

S.No	Treatment	Colour	Odour	Temp (^{o}C)
1.	Jhusighat of Ganga (Alld) (G1)	Light Brown	Odour less	15.9
2.	Rasulabad ghat of Ganga (Alld) (G2)	Light Brown	Odour less	22.0
3.	Naini Ghat of Yamuna (Alld) (G3)	Dark Brown	Odour less	22.1
4.	Sangam ghat (Alld.) (G4)	Light Brown	Odour less	23.1
5.	Harishchandra ghat of Ganga (Varanasi) (G5)	Dark Brown	Slight odour present	30.5
6.	Baluaghat of river Yamuna (Alld) (G6)	Light Brown	Odour less	22.2
7.	Saraswati ghat of Yamuna (Alld) (G7)	Light Brown	Odour less	21.3
8.	Manikankaghat of Yamuna (Varanasi) (G8)	Dark Brown	Slight odour present	32.4
9.	Gaughat of Yamuna (Alld) (G9)	Light Brown	Odour less	20.3
10.	Daraganj of Ganga (Alld) (G10)	Dark Brown	Slight odour present	30.0

TABLE No-1.3: BIOLOGICAL PROPERTIES OF DIFFERENT GHATS OF RIVERS AT AROUND ALLAHABAD AND VARANASI (DISTRIBUTION OF FUNGI)

S.No	Treatment	*Mucor* sp	*Fusarium* sp	*Phoma* sp	*Ascobolue* sp	*Soproleghia* sp	*Achlya* sp
1.	Jhusighat of Ganga (Alld) (G1)	-	—	—	+	+	—
2.	Rasulabad ghat of Ganga (Alld) (G2)	—	+	—	—	—	+
3.	Naini Ghat of Yamuna (Alld) (G3)	+	+	—	+	—	+
4.	Sangam ghat (G4)	—	—	—	—	—	—
5.	Harishchandra ghat of Ganga (G5)	+	+	+	+	—	—
6.	Baluaghat of Yamuna (G6)	—	—	—	+	—	—
7.	Saraswati ghat of Yamuna (G7)	—	—	+	+	—	+
8.	Manikankaghat of Yamuna (G8)	+	+	+	+	+	+
9.	Gaughat of Yamuna (G9)	—	—	+	+	+	—
10.	Daraganj of Ganga (G10)	—	—	+	+	+	+

(+): Present
(-): Absent

TABLE No-1.5: TOTAL NUMBER OF BACTERIA IN DIFFERENT GHATS OF RIVERS AT AROUND ALLAHABAD AND VARANASI

S.No	Treatment	Population of Bacteria ($1x10^{3/1}$)	
		Total Coliforms	Total Bacteria
1.	Jhusighat of Ganga (G1)	49.0	--
2.	Rasulabad ghat of Ganga (G2)	40.0	157.10
3.	Naini Ghat of Yamuna	47.2	180.20
4.	Sangam ghat	43.0	--
5.	Harishchandra ghat of Ganga	85.10	215.10
6.	Baluaghat of Yamuna	42.00	200.30
7.	Saraswati ghat of Yamuna	41.0	--
8.	Manikankaghat of Yamuna	92.30	245.20
9.	Gaughat of Yamuna	40.0	--
10.	Daraganj of Ganga	73.0	205.40

TABLE No-1.5: CONCENTRATION OF HEAVY METALS (MG-10) IN WATER OF DIFFERENT GHATS AROUND ALLAHABAD AND VARANASI

S.No	Treatment	Pb.	Cr.	Cd.
1.	Jhusi ghat	0.408	0.299	0.051
2.	Rasulabad ghat	0.412	0.252	0.044
3.	Naini Ghat	0.432	0.267	0.045
4.	Sangam ghat	0.342	0.202	0.031
5.	Harishchandra ghat	0.443	7.013	0.055
6.	Baluaghat	0.386	0.23	0.039
7.	Saraswati ghat	0.359	0.233	0.044
8.	Manikankaghat	0.448	12.33	0.057
9.	Gaughat	0.342	0.233	0.038
10.	Daraganj	0.432	1.561	0.051

REFERENCES

Biligrami, K.S., Bhowmick, B.N. and Singh, A.K. (1983): Impact of a boitic factor on bacterial population of river Ganges, Proc. Indian Natn. Sci. Acad., B62(4): 509-514.

Casta, Banedict. (1974): Pollution and Die, Illustrated weekly of India, pp. 19 (December).

Dwivedi, B.K. and Pandey, G.(1999): Environmental Pollution (Book), Published by B.R.S., Allahabad page No. 1-234.

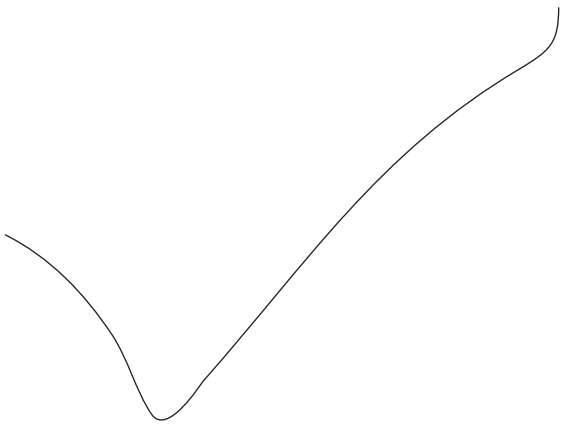
Garg, P., Tiwari, D. Pandey, A. Shukla, Suman and Shukla, D.N. (2005): Physio-Chemical characteristics of yamuna water. A case study of Agra region. Ind. J. Envijron. Res. 2(2); 255-257.

Jetly, Rekha, Khan, M.A. and Mathur, A. (1999): Heavy metals and pesticides in river Ganga. Environmental pollution (Book, published by BRS) page no. 219-226.

Kumar, A., Tiwari, D. Garg, P. Yoges, J.S. and Shukla, D.N. (2005): Heavy metal pollution in Ganga and yamuna river at Allahabad region. Ind. J. Environ. Res. 2(2): 224-226.

Singh, A.K. and Bhowmick, B.N. (1985): Effect of Sewage physico-chemical characterstic and bacterial population of river Ganga at Patna, Ind. J. Ecol., 12 (1): 17-19.

Somashekar, R.K. Ramaswamy, S.N. and Govindappa, D.A. (1982): On the extra aquatic fungi from polluted and non-polluted waters of River kalipa Karnataka. Proc. Indian Natn. Sci. Acad. 347 (5): 635-641.



Journal of Natural Resource and Development 9 (2) : 33-38 , 2014

INFLUENCE OF PRUNING LEVELS AND BIO-FERTILIZERS ON PRODUCTION OF ROSE CUT FLOWER (ROSA SPP. L.) CV. SUREKHA

Manoj Kumar Singh and Surya Narayan
Department of Horticulture, KAPG College, Allahabad (U.P.), India

Received : 28.08.2014 *Accepted : 12.09.2014*

ABSTRACT

The number of cut flowers per bush were recorded highest (16.18) when pruned at five bud with recommended dose of fertilizers (RFD) + soil applied bio-fertilizers (SAB) + foliar spray of vermi-wash. Deeper the pruning lower the cut flower number per bush were observed. Quality blooms were found to increased with increase in severity of pruning up to one bud level. The recovery of grade C flower with four and five bud level were observed and no such kind of cut flower was recorded when pruned at 3.2 and or 1 bud level. Biofertilizers influenced significantly the number of cut flower per bush and grade too. Number of flowers per bush at same level of pruning were found significantly greater with SAB + vermi-wash spray followed by SAB + biodynamic. SAB + horne manure. SAB and F0. control (RFD). Conclusively pruned at 3 bud + SAB + foliar spray of vermi-wash was found best in terms of economy of rose cut flower production at field level.

Key Word: Pruning, rose, bio-fertilizer, vermi-wash, bio-dynamic, cut flower.

Among the cut flowers rose stand fist in terms of trade and likeness. Its cultivation is very scientific and precise to optimize profit/unit of input investment. Hi-tech cultivation is more easy and remunerative as compared to open field condition. Where both the yield and quality attainment are the limiting factors in its commercialization.

To unfold potential of the plant, environment plays crucial role. Cultural practices and nutrition remain the only feasible option on the part of the farmer to provide typical environment to the plant. Roses well responded to pruning when done judiciously and controls vigour, yield and quality characters of plant.

Indiscriminate use of fertilizers and other agrochemical vanished our bountiful beneficial micro-organism from the soil and caused infertile and unproductive soil. Addition of plentiful organic residue in the soil through bulky manures as FYM and compost has become difficult due to farm mechanization. In this respect, bio-fertilizers play multifaceted role by not only enriching the soil micro-organism but also as nutrients, stabilizers,

hormones and insulators. They also give quick response like chemicals when applied as fohar spray.

Keeping above aspects in view the experiment was undertaken to find out the effect of pruning level and bio-fertilizer on yield and quality of rose cut flowers cv. Rakta Local in Allahabad condition.

MATERIALS AND METHODS

The experiment was carried out at K. P. Trust Farm Ujahini by the Department of Horticulture, K. A. P. G. College, Allahabad (U.P.) during the year 2005-06. The budded rose of cv. Rakta Local were purchased from nursery, and planted in the field in 2003. The progressive farmers of the area used grow this variety as cut flower in small scale. Hardiness, vigour, floriferous-ness, input responsive, local demand and locally availability of planting material are the some positive points for the adoption. After 3-4 year of planting bushes becomes less productive and uneconomic. There were two factors i.e. pruning level and bio-fertilizers were tried. Pruning was done on 7th Oct. 2005 in all the plants with 5 levels (at P_0-5 bud, P_1-4 bud, P_2-3 bud, P_3-2 bud and P_4-1 bud) and five level of biofertilizers (F_0- no fertilizers and only recommended dose of fertilizer (RFD) i.e. 120, 60, 80 NPK kg/ha. F_1-Bio-fertilizers as Azotobacter 50 gm + Phosphorus Solubulizing Bacteria, (PSB) 50 gm + Potash Mobelizing Bacteria (PMB), 50 gm/plant were incorporated in to the soil after pruning, F2-Biofertilizers + Biodynamic @ 5% foliar spray after 45 days of pruning, F_3-Bio-fertilizers + Horne manure @ 5%, foliar spray after 45 days of pruning and F4-Bio-fertilizers + Vermi-wash @ 5% foliar spray after 45 days of pruning).

Thus 5^2 factorial randomized block design with three replication farming 25 (T_0-T_{24}) treatment combinations were used. The plants were spaced at 75*75 cm. And 5 plants per plot (7.5*7.5 m plot size) were accommodated, thus total number of plants (375) were planted in 75 plots. After pruning operation five stems were left and all the sprouted shoots reaching to the bud stage were detached and counted as number of cut flowers/bush. The number of cut flowers/ha. were calculated by multiplying the number of flower/bush * total number of plants/ha. (i.e. 17777/ha. planted at 75*75 cm. distance). Cut flowers were graded according to length of cut flowers (from stem base to bud tip) and data were taken as number of cut flower/ha. of Grade A,B,C and D. The grades were as A = cut flower stem length > 60/cm., B = > 45 to 60 cm., C = 35 to 45 cm. and D = < 35 cm . The cut flower of grade D were have no market value and in calculation of cost/benefit ratio the price of such Grade flowers was put zero. The Grades were also calculated in percent.

To find out the cost/benefit ratio, the cost of cultivation and gross income per/ha. were calculated, as per local market (Allahabad City) trend. The Grade A cut flowers @ Rs. 2.5/stem, Grade B @ Rs. 1.5/stem, Grade C @ Rs. 1.0/stem and Grade D @ Rs. 00/stem to

analyze the Gross income/ha. Net income was obtained by subtracting cost of cultivation from Gross income. Similarly the C/B ratio was worked out by dividing Grass Income with cost of cultivation.

RESULTS AND DISCUSSION

All the parameters taken were significantly affected by pruning level and bio-fertilizers application. Number of cut flowers were reduced with reduction in retained bud per shoot. Highest number of cut flower/bush (16.18) were observed in T_4 (at 5 bud pruning + Bio-fertilizer + Vermi-wash spray), while the lowest cut flower number/bush (3.98) were in T_{20} (at one bud pruning + no Biofertilizers). As bud number per shoot reduced the number of flower/bush also found reduced. At same level of pruning the variation in flower number was due to effect of bio-fertilizer and in all treatment vermi-wash found best followed by biodynamic preparation and Horn manure. The control (only recommended dose of fertilizer) yielded lowest number of cut flower/stem. The number of cut flowers/bush were directly proportional to the number of bud/bush retained after pruning because buds get sprouted and produced cut flowers. The effect of soil applied bio-fertilizers are obvious that they provide nutrition, hormones, congenial rhizosphere which ultimately forced bud to sprout in more number. Though bio-fertilizers spray were done after bud sprouting is well over, therefore their effect can't be realized.

Quality blooms recovery found to be

Table: 1 Effect of pruning level and bio-fertilizers on vigour of Rose cut flowers(Pooled Data)

Treatment	Cut flower length(cm.)	Cut flower dia at base(cm.)	Cut flower dia at neck(cm.)	Cut flower weight(g)	Bud length (cm.)	Bud dia(cm.)	Bud weight(g)	No. of leaves per shoot
T_0	25.78	2.57	1.99	35.53	2.88	4.28	1.60	15.46
T_1	28.68	2.74	2.22	39.64	3.12	4.63	1.73	17.20
T_2	32.32	2.97	2.23	41.60	3.27	4.85	1.81	19.40
T_3	31.17	2.89	2.30	41.07	3.23	4.80	1.79	18.70
T_4	33.57	3.07	2.37	42.32	3.33	4.94	1.84	20.38
T_5	32.11	2.95	2.31	41.25	3.25	4.82	1.80	19.26
T_6	34.09	3.08	2.34	4178	3.29	4.88	1.82	20.45
T_7	36.54	3.22	2.39	42.67	3.36	4.99	1.86	21.92
T_8	35.89	3.18	2.32	41.42	3.26	4.84	1.80	21.53
T_9	38.68	3.35	2.40	42.85	3.37	5.00	1.86	23.20
T_{10}	48.31	3.94	2.47	44.10	3.47	5.15	1.92	28.98
T_{11}	58.83	4.58	2.81	15.17	3.95	5.87	2.18	35.29
T_{12}	84.88	5.17	2.98	52.32	4.19	6.22	2.32	50.92
T_{13}	70.79	4.91	2.83	50.53	3.98	5.91	2.20	42.47
T_{14}	89.33	5.42	3.17	56.42	4.44	6.59	2.46	53.59
T_{15}	87.47	5.33	3.09	55.17	4.34	6.14	2.40	52.48
T_{16}	90.11	5.49	3.16	56.42	4.44	6.59	2.46	54.06
T_{17}	90.83	5.53	3.18	56.78	4.47	6.64	2.48	54.49
T_{18}	91.33	5.56	3.20	56.14	4.50	6.68	2.49	54.79
T_{19}	91.99	5.60	3.22	57.50	4.53	6.73	2.51	55.19
T_{20}	89.09	5.42	3.12	55.71	4.38	6.50	2.42	53.45
T_{21}	82.18	5.61	3.13	57.50	4.53	6.73	2.51	55.30
T_{22}	92.78	5.65	3.25	58.03	4.57	6.79	2.53	55.86
T_{23}	93.11	5.69	3.26	58.21	4.58	6.80	2.54	55.86
T_{24}	94.35	5.69	3.29	58.75	4.62	6.86	2.56	55.61
SE+	**0.750**	**.057**	**.148**	**.830**	**.058**	**.107**	**0.036**	**0.463**
CD at 5%	**2.35**	**.173**	**.345**	**2.49**	**.175**	**.321**	**.110**	**1.389**

Table: 2 Effect of Pruning level and Bio-fertilizers on yield and quality of Rose cut flowers(Pooled Data)

Treatment	No. of cut flower/bush	No. of cut flower/ha.	No. of cut flower/ha. of Grade A (000')	No. of cut flower/ha. of Grade B (000')	No. of cut flower/ha. of Grade C (000')	No. of cut flower/ha. of Grade D (000')
T_0	15.38	2.81	26.69(9.50)	80.14(28.52)	99.05(35.25)	75.11(26.73)
T_1	15.88	2.82	27.07(9.60)	84.76(30.06)	98.70(35.00)	71.45(25.34)
T_2	15.90	2.82	29.61(10.50)	101.52(36.00)	99.40(35.25)	51.65(18.25)
T_3	15.87	2.82	27.77(9.85)	101.52(36.00)	99.12(35.15)	50.76(18.00)
T_4	16.18	2.87	34.00(11.85)	112.36(39.15)	100.45(35.00)	40.18(14.00)
T_5	11.09	1.97	43.34(22.00)	83.07(42.17)	55.61(28.23)	15.48(7.83)
T_6	11.88	1.96	45.13(23.03)	84.26(42.99)	52.92(27.00)	13.68(6.98)
T_7	12.22	2.17	55.90(24.38)	98.47(45.69)	52.79(24.33)	12.15(5.60)
T_8	12.11	2.15	50.14(23.33)	95.18(44.37)	55.14(25.65)	14.57(6.75)
T_9	12.39	2.20	55.77(25.35)	98.93(44.97)	53.52(29.33)	11.77(5.35)
T_{10}	9.99	1.77	111.57(63.00)	45.61(25.77)	18.10(10.23)	0.00
T_{11}	10.11	1.79	117.87(65.85)	44.75(25.00)	16.37(9.15)	0.00
T_{12}	10.32	1.83	121.40(66.34)	53.01(28.97)	8.58(4.69)	0.00
T_{13}	10.19	1.81	119.26(65.89)	52.49(29.00)	9.24(5.1)	0.00
T_{14}	10.99	1.95	130.29(66.82)	55.67(28.55)	9.02(4.63)	0.00
T_{15}	7.10	1.26	85.68(68.00)	35.28(28.00)	5.04(4.00)	0.00
T_{16}	7.23	1.28	87.18(68.11)	36.03(28.15)	4.78(3.74)	0.00
T_{17}	7.78	1.38	96.60(70.00)	27.8(20.15)	13.59(9.85)	0.00
T_{18}	7.65	1.35	94.29(69.85)	27.40(20.30)	13.29(9.85)	0.00
T_{19}	7.88	11.40	99.37(70.98)	26.62(19.02)	14.00(10.00)	0.00
T_{20}	3.98	0.70	52.88(75.55)	14.95(20.50)	2.79(3.95)	0.00
T_{21}	4.11	0.73	56.31(77.15)	13.38(18.33)	3.29(4.52)	0.00
T_{22}	4.73	0.84	75.09(89.38)	6.40(7.60)	2.52(3.00)	0.00
T_{23}	4.29	0.76	68.08(89.58)	5.70(7.51)	2.21(2.91)	0.00
T_{24}	4.89	0.86	78.04(90.75)	7.09(8.25)	0.86(1.00)	0.00
SE+	**0.007**	**0.008**	**2.910**	**2.649**	**2.712**	**2.443**
CD at 5%	**0.021**	**0.024**	**8.731**	**7.948**	**8.135**	**7.341**

decreased with increased in bud number/shoot. Highest best quality (Grade A) cut flower percentage (90.75) was observed in T_{24} (pruning at one bud + soil applied bio-fertilizers + vermin-wash foliar spray) while the lowest percentage (9.50) of Grade A cut flower was observed in T_0, control (pruning at 5 bud +RFD). Number of shoot/bush was found inversely proportional to the vigour of shoot retained on the bush. Principally the partition of metabolites, space and solar radiation among the shoots confined to that bush are the prominent causes of shoots vigour. Occurrence of Grade D flowers (No market value) on bushes pruned at 4 bud and or 5 bud level might be due to deficiency of vigour limiting factors. There was no any Grade D cut flower was observed in the bushes pruned at 1, 2 and or 3 bud level. The variation among the same level pruned treatment was due to nutrition and vermi-wash spray shows pronounced effect followed by biodynamic and Horn manure. Even soil applied bio-fertilizers yielded better result over control.

Table: 3 Effect of Pruning level and Bio-fertilizers on economy of Rose cut flowers production (Pooled Data)

Treatment	Income from grade A cut flower (Rs. 000')/ha.	Income from grade B cut flower (Rs. 000')/ha.	Income from grade C cut flower (Rs. 000')/ha.	Gross income (Rs. 000')/ha.	Cost of cultivation (Rs. 000')/ha.	Net return (Rs. 000')/ha.	Cost/benefit ratio
T_0	66.73	120.21	99.05	286.00	187.00	99.00	1:1.52
T_1	67.68	127.15	98.70	293.53	187.00	106.53	1:1.56
T_2	73.76	129.27	99.75	302.79	187.00	115.79	1:1.61
T_3	69.44	128.16	98.27	295.88	187.00	108.88	1:1.58
T_4	85.02	131.77	97.58	314.37	187.00	127.37	1:1.68
T_5	108.35	124.61	55.61	288.57	200.00	88.57	1:1.44
T_6	112.84	126.39	52.92	292.15	200.00	92.15	1:1.46
T_7	132.26	147.71	52.79	332.76	200.00	132.76	1:1.66
T_8	125.39	147.77	55.14	328.31	200.00	128.31	1:1.64
T_9	139.42	148.40	53.52	341.32	200.00	141.32	1:1.70
T_{10}	278.77	68.41	18.10	365.30	213.00	152.30	1:1.71
T_{11}	294.68	67.12	16.37	378.18	213.00	165.18	1:1.77
T_{12}	303.50	69.12	18.53	391.60	213.00	178.60	1:1.83
T_{13}	298.15	78.73	9.24	386.13	213.00	173.13	1:1.81
T_{14}	325.74	83.50	9.02	418.28	213.00	205.28	1:1.96
T_{15}	214.20	52.92	5.04	272.16	213.00	59.16	1:1.27
T_{16}	217.95	55.04	4.78	276.78	213.00	63.78	1:1.29
T_{17}	241.50	41.71	13.59	296.80	213.00	83.80	1:1.39
T_{18}	235.74	41.10	13.29	295.90	213.00	82.90	1:1.38
T_{19}	248.43	39.94	14.00	302.34	213.00	89.37	1:1.41
T_{20}	132.21	21.52	2.76	156.50	213.00	56.49	1:0.73
T_{21}	140.79	20.07	3.29	264.16	213.00	48.83	1:0.77
T_{22}	187.69	9.60	2.52	199.81	213.00	13.18	1:0.93
T_{23}	170.20	8.56	2.21	180.97	213.00	32.02	1:0.84
T_{24}	195.11	10.64	0.86	206.61	213.00	6.38	1:0.97
SE+	**0.62**	**1.24**	**1.28**	**0.91**		**2.730**	
CD at 5%	**1.85**	**3.74**	**3.84**	**2.73**		**8.19**	

There-bud pruning level showed best result over 4,5,2 and or 1 bud pruning level in terms of vigour, yield, quality and economy of cut flower production. Cost/benefit ratios were found significantly better with 3 bud pruned bushes than those pruned rather at 5,4,2 and or 1 bud level. Highest C/B ratio (1 : 1.96) was observed in T14 pruned at 3 bud + SAB and foliar application of vermiwash treatment. Treatment T_{24} yielded maximum percentage (90.75) of Grade A cut flowers but stem number/bush were found to reduce drastically so that C/B ratio (1 : 0.97) too. The control (T0)produced higher number of cut flower/bush (15.83%) but due to grade D cut flower very high in percentage (26.73) made them uneconomic and C/B ratio remains only 1 : 1.52. The variation among the same pruned treatments was observed due to bio-fertilizers.

These findings are in conformity with the finding of Rajan et. al. (2008), Ganesh (1996), Joi and Shinde (1976), Wange (1995), Moe (1972), Gault and Synege (1971), Pal (1998), and (Malik and Dadlani 1984).

CONCLUSION

Pruning levels and bio-fertilizers influenced significantly the vigour, yield, quality and C/B ratio in rose cut flower production. Cultivar Rakhta Local returns higher when pruned at 3 bud level along with soil application of bio-fertilizers and foliar spray of vermi-wash in Allahabad condition.

REFERENCES

Ganesh, R. K. 1996 studies on the efficiency of bio-fertilizers with different levels of N on growth yield and quality of Okara. M. Sc. Thesis, JNKVV, Jabalpur.

Gualt, S.M. and Synege, P.M. 1971. The Dictionary of roses in color, Rain-bird Publishing Group Ltd. London.

Joi, M.S. and Shinde, R.A. 1976. Response of Onion to bacterization J. of Maharas. Agric. Univ.2-6 : 161-162.

Malik, R.S. and Dadlani, N.K. 1984. Pruning effect on rose cut flower production, Indian Hort., 29 : 27-30.

Moe, 1972. Pruning effect on rose cut flower production. J. Amer. Soc. Hort. Sci., 97 : 976-800.

Pal, B.P. 1978. All about Roses. Vikash publishing house Pvt. Ltd., New Delhi.

Rajan, K.O. Tarence, T. and Arun A. D. 2008. Effect on inorganic, organic and biological sources of nutrients on growth yield and tuber quality of potato. The Allahabad Farmer Vol. LXIV No. 1, July 2008. PP.95-103.

Wange, S.S. 1995. Response of garlic to combined application of bio-fertilizers and fertilizers nitrogen. J. Soil, Crops, 5(2) : 115-116.

Journal of Natural Resource and Development 9 (2) : 39-45 , 2014

PHYSICOCHEMICAL ANALYSIS OF LONY DAM AND ITS EFFECTS ON GROWTH OF FISHES AND ITS PRODUCTION

Yogesh Mishra
Department of Zoology
Bhavans Mehta Mahavidyalaya, Bharwari, Kaushambi (U.P.), India

Received : 07.06.2014 *Accepted : 24.07.2014*

ABSTRACT

According to result it was concluded that the present water body was noted to have alkaline water throughout the year at all sites and seasons. It is evident from the pH values that present water body has moderate potential of productivity. The total annual fish production of 5173kg in 2009-10 and 7175kg in 2010-11, was collected from the present water body. It was found that the fish production of the dam can be enhanced by proper management of fish culture and to fulfil the fish requirement of villagers near the dam.

Key Words: Physicochemical analysis, lony dam, fish productivity, fish culture

The lony dam has high socioeconomic status and contributes the basic means to provide hydro-electric power, irrigation through canals, and production for fish food and space for sewage and water disposal. The lony dam water also provides drinking water for animals and a means of recreation to the villagers.

The maximum species diversity was noted in summer season while minimum in winter and moderate in rainy season.

MATERIALS AND METHODS

The present study was carried out on lony dam and on Lony River situated at the junction of Allahabad and Rewa district in Uttar Pradesh and Madhya Pradesh border. The experiment was conducted from July 2009 to June 2011. The sampling work of present water body was carried out in the year 2009-10 and 2010-11. The samples were collected from surface and bottom water between 10.00 AM to 12.00 AM. A number of four sampling sites were selected. The two sites A and B from littoral and C, D from limnetic zones. Only clean and dried sample bottles were selected for sampling work. (Table -1).

The transparency and temperature of water was recorded by Secci disc and Celsius thermometer respectively. A standard method suggested by APHA (2006) was used for qualitative estimation of free carbon dioxide, dissolved oxygen , nitrates , alkalinity , calcium and magnesium hardness in the laboratory. Hanna instrument is used for the measurement of pH, temperature and total dissolved solids.

This instrument was immersed in a thoroughly shaken water sample and the readings in °C were noted down. For measurement of pH, the pH meter was calibrated with buffer solution and the instrument was immersed in well mixed samples and readings were noted. To analyse the Dissolved Oxygen content an automatic oxygen analyser was used. A standard method suggested by APHA (2006) was used for qualitative estimation of free carbon dioxide in the laboratory. Total alkalinity was measured by adding 3-5 drops of methylorange to the sample, when yellow colour occurred it is titrated against 0.02N sulphuric acid until the colour changed to orange. The volume of sulphuric acid was noted. Calcium hardness of water was calculated by oxalate method and calcium + magnesium by titrating with Ethylene Diamine Tetraacetate (E.D.T.A). Magnesium was obtained by the subtraction of calcium from calcium +magnesium. Measurement of nitrates, sulphates and phosphates was done by Spectrophotometer. The physicochemical conditions of water depend on the Meteorological condition of the area. The physical factors affect the chemical factors and responsible for the qualitative and quantitative variations in the micro and macro organisms, planktons and water quality of the system. (Table - 2)

To estimate the quantitative values of physicochemical parameters the water samples were taken to the laboratory and were analysed by applying the standard method (APHA 2006).

RESULTS AND DISCUSSION

The physicochemical conditions of water depend on the meteorological conditions of the area. The physical parameters such as temperature, turbidity play an important role in the dam productivity . The quality of the dam water was decided by the levels of the chemical parameters including dissolved minerals , gases and pH.

It is important to note that no significant differences in the variability of physicochemical factors were found between surface and bottom water therefore the values of surface water taken into account to discuss the figures and facts of the study. The value of transparency was noted to be moderate in lony dam, its high value appeared in summer and moderate in monsoon and winter . The reason of high transparency in summer was that of low depth of water , high intensity of sunlight and precipitation of turbidity . The transparency of lony dam ranged from 61.05 to 71.00 in 2009-10 and 55.4 to 71.2 in 2010-11. The transparency affects the photosynthesis, growth and primary productivity of the system.

The temperature has an important role in deciding the biotic featuers of the water body. The mean value of ambient water temperature at lony dam varied from 14.5 °C to 36.5°C. The water temperature was shown variation with

seasons and sites. Dissolved oxygen is the most popular and significant parameter. APHA (1985) has considered this parameter as the key test to understand water pollution and degree of eutrafication. The mean value of Dissolved Oxygen in present water body varied from 5.3mg/l to 9.4mg/l in 2009-10 and 4.32 to 12.0mg/l in 2010-11. The pH value of lony dam varied between 7.1 to 8.6mg/l in 2010-11. It was shown that the lony dam had alkaline water throughout the study period. This water is suitable for aquaculture. The high pH in summer and low pH in winter were recorded in present study. The average free carbon dioxide at lony dam varied from 5.2 to 6.4mg/l. The highest was noted in summer and lowest in winter. According to Wetgel (2006). The change in pH value are brought by the loss of carbon dioxide in photosynthesis and addition of carbon dioxide from respiration of aquatic organisms. The present water body was found to have high range of total alkalinity. It is varied from 130.0 to 284mg/l. Its maximum value was recorded from September to February . The high range of alkalinity might be found due to greater dissociation of carbonic acid at high temperature. The total hardness in lony dam was recorded with a wide range of 217 to 275mg/l in 2009-10 and 2010-11. It indicates that water had high hardness throughout the year. The magnesium , calcium and sulphate hardness was recorded a moderate to high range during the study period . The seasonal changes of Ca , Mg and sulphate were also recorded. The nitrogen content of present water body varied from 0.2 to 0.4mg/l. Its maximum value in summer and moderate in monsoon and low in winter. It was found that the source of nitrates is fertilizers, decayed vegetables and animal matter. The range of phosphate recorded from the present water body was 0.2 to 0.4mg/l during the study . The phosphate fertility in the lony dam indicates as an index of aquatic productivity. (Table - 3)

The high values of temperature , pH and transparency were the most valuable parameters that has affected all the segments of zooplankton and phytoplankton quantitatively and qualitatively . These are the factors that usually govern the seasonal growth and distribution of biotic communities in fresh water the seasonal values of physicochemical parameters during 2009-10 and 2010-11 has promoted the growth of zooplanktons and phytoplanktons. Among zooplanktons the species composition includes organisms of protozoa, rotifera, cladocera and copipoda . The values of species composition were comparatively higher during summer season as compared to rainy and winter season at all sampling sites of lony dam. Among protozoans , paramecium, among rotiferas, brachionus angularis , among cladocerans , daphnia species and among copipodes, cyclopes species showed maximum composition at most sampling sites during all the seasons. Among phytoplanktons the species compositions comprises four families viz. Chlorophyceae , Cynophyceae , Euglinophyceae and Bacilariophyceae. Among

chlorophyceae Spirogyra species, among Cynophyceae Spirulina species, among Euglinophyceae Ficus, among Bacilariophyceae Navicella species showed maximum composition at all sampling sites.

Fishes being the highest consumer, had been taken as the measure for secondary production in the present study. The quantitative values of annual fish catch were recorded and are tabulated month wise in table 4 and 5 . The

TABLES AND FIGURES

Table 1 :- showing Names, Depth ranges and Site types

Sampling sites	Depth range (meters)	Site types
A	1.5-4.0	Littoral
B	1.0-3.0	Littoral
C	3.5-6.5	Limnetic
D	4.5-8.0	Limnetic

Table 2: Meteorological data of Rewa district for 2009-10 and 2010-11

Sl. No.	Month	Minimum temp. ° C		Maximum temp. ° C		Rainfall (mm)		Maximum % humidity		Minimum % humidity	
		2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011
1	July	25.0	24.6	34.0	32.8	226.2	462.0	82	86	65	74
2	August	25.7	25.8	31,8	32.0	225.5	115.5	90	88	75	70
3	September	22.5	24.8	32.5	31.5	175.2	100.2	92	90	62	65
4	October	20.5	19.0	31.2	31.8	28.0	Trace	94	92	54	64
5	November	12.6	10.2	27.5	28.9	0.5	0.0	85	85	40	65
6	December	7.5	8.2	25.0	24.5	0.0	2.5	84	84	46	58
7	January	5.6	7.2	23.0	24.0	32.2	0.0	87	83	55	48
8	February	9.5	10.8	26.0	28.5	8.0	0.0	84	83	38	42
9	March	16.0	12.0	32.0	32.5	18.2	15.5	85	84	45	34
10	April	18.5	17.5	38.0	37.4	4.5	35.8	82	83	34	30
11	May	22.6	26.0	42.0	40.5	3.5	27.5	72	.	36	37
12	June	26.0	28.0	40.0	42.8	196.0	65.0	75	65	54	38

Table 3 :- Seasonal Value of Physicochemical Parameters During 2009-10 And 2010-11

Sl. No.	Parameters	Rainy season		Winter season		Summer season	
		2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011	2009 to 2010	2010 to 2011
1	Transparency	65.5	58.1	58.6	66.4	66.5	69.6
2	Temperature	25.50	18.40	29.50	28.1	20.7	30.6
3	D/O	5.6	5.2	5.2	10.8	9.2	5.0
4	pH	7.8	7.8	7.5	7.9	8.2	8.2
5	Carbon dioxide	6.4	6.4	6.0	5.4	6.2	5.2
6	Alkalinity	130.4	131.2	284.6	266.2	132.5	135.2
7	Total hardness	223.0	260.7	217.9	233.7	224.6	275.3
8	Magnesium	21.2	20.5	17.5	21.7	20.6	19.6
9	Nitrates	0.2	0.4	0.2	0.3	0.2	0.4
10	Sulphates	17.9	20.6	20.1	22.9	23.2	15.8
11	Phosphates	0.2	0.4	0.2	0.3	0.2	0.4
12	Calcium hardness	86.3	83.9	82.6	85.1	86.4	87.1

TABLE 4:-Showing the dynamics of secondary fish production in term of fish catch at Lony dam (Rewa M.P.) during 2009-10

S.No.	Month	Katla		Rohu		Mrigal		Local Large		Local Small		Total Kgs
		No.	Kgs	No.	Kgs.	No.	Kgs	No.	Kgs	No.	Kgs	
1	July 09	NIL	-	NIL	-	NIL	-	NIL	-	NIL	-	-
2	Aug 09	-	-	30	55	40	60	-	8	-	80	203
3	Sept 09	15	45	44	65	43	55	-	40	-	80	285
4	Oct 09	10	40	32	54	16	25	-	25	-	90	234
5	Nov 09	-	-	-	-	-	-	-	-	-	-	-
6	Dec 09	10	35	60	90	20	32	-	20	-	105	284
7	Jan 10	10	36	25	35	10	14	-	16	-	72	173
8	Feb 10	42	126	102	150	100	116	-	20	-	140	552
9	Mar 10	105	510	310	520	180	240	-	60	-	240	1570
10	Apr 10	25	95	80	120	60	90	-	45	-	180	530
11	May 10	7	30	140	180	80	130	-	100	-	205	645
12	Jun 10	3	12	130	220	105	145	-	140	-	180	697
Total			929		1489		907		476		1372	5173
Per.%			17.95 %		28.78%		17.5 %		9.27 %		26.52 %	

Local large includes Silver Carp, Grass Carp, Common Carp, Singhi, Padhan, Kalbasu and Saur etc.

Local small includes Patola, Puthia and other varietie

Table 5 :-Showing the dynamics of secondary Fish production in term of fish catch at Lony dam (Rewa M.P.) during 2010-11

S. No.	Month	Katla		Rohu		Mrigal		Local Large		Local Small		Total Kgs
		No.	Kgs	No.	Kgs.	No.	Kgs	No.	Kgs	No.	Kgs	
1	July 09	NIL	-	NIL	-	NIL	-	NIL	-	NIL	-	NIL
2	Aug 09	4	42	48	72	70	85	-	10	-	105	304
3	Sept 09	18	60	62	85	58	70	-	50	-	110	385
4	Oct 09	6	24	46	56	18	23	-	20	-	88	211
5	Nov 09	3	10	10	16	7	12	-	10	-	25	73
6	Dec 09	15	56	52	72	42	58	-	30	-	160	376
7	Jan 10	18	64	35	45	18	24	-	30	-	85	283
8	Feb 10	50	168	135	180	130	145	-	30	-	185	708
9	Mar 10	162	615	412	610	290	362	-	85	-	360	2032
10	Apr 10	35	132	125	180	180	220	-	60	-	295	887
11	May 10	9	36	200	295	120	200	-	140	-	250	921
12	Jun 10	5	20	195	350	140	200	-	180	-	290	140
Total			1227		1961		1399		635		1953	7175
Per.%			17.10%		27.33%		19.49%		8.85%		27.21%	

Local large includes Silver Carp, Grass Carp, Common Carp, Singhi, Padhan, Kalbasu & Saur etc.
Local small includes Patola, Puthia & other varietie

fishes were caught from this water body are mainly Rohu, Catla and Mrigala. Some other fishes were caught locally are Silver carp, Common carp, Singhi, Padhan, Kalbasu and Saur, some local small fishes include Patola, Puthia and other varieties . The data of fish catch were collected from authentic govt record and local contractors living around the lony dam. As per the official estimation and the information collected from the local contractors the total annual fish catch of 5137 kg in 2009-10 and 7175 kg in 2010-11 was collected from the present water body. Hence average fish productivity was found to be of 3.12 kg/ha in 2009-10 and 4.332 kg/ha in 2010-11. The maximum catch of about 1570 kg in 2009-10 and 2032 kg in 2010-11 was found in the month of March while the minimum catch of about 73 kg was found in the month of November. It is also evident from the data that the highest value of fish catch of 173 kg in 2009-10 and 238 kg in 2010-11 was made in the month of January. Therefore the dam has shown the moderate range of fish productivity. It indicates that the

limnology of present water body is still quite suitable for extension of aquaculture and fisheries based on fresh water system (Table 4 and 5)

REFERENCES

APHA (1995). American public health Association, American water works association, water environment federation standard methods for the examination of water and wste water, American public health association, Washington, D.C.

David, N.M. and Simmons, FJ. (1003) fisheries acostics (III us), 352 p. Blackwell sic

Gagde, U.S. and Verma, A.K. (1985). Physico-chemical characteristics of water of J.N.U. Lake at New Delhi. Indian J. Ecol., 12 (1) : pp. 151-156.

Indian Journal of Fisheries Vol. 58, Number-1/2011. Proceedings of Indian. National science Academy, 2/June 2010 Vol. 76.

Journal of fish biology-Jan 2011 Volume 78.

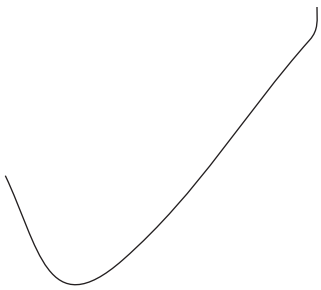
Sreenivasan, A. (1966). Hydrological factors and fish production in Stanley reservoir, Metturdam Int. Rev. Ges. Hydrobiology. 51: 295-306.

Srivastava, U.K. and Valhalla, S. (1984). Strategy for development of inland fishery resources in India. Concept Publishing House, New Delhi.

Trivedi, R.K. and Goel, P.K. (1986). Chemical and Biological Methods for Water Pollution Studies, Environmental Publications, Kara d, India; 250 p.

Welch, P.S. (1948). Limnological methods. New York, USA.

Wetgel, R.G. (2006). Limnology, 3rd edition, Academic Pres, New York.



Journal of Natural Resource and Development 9 (2) : 46-47 , 2014

OBSERVATIONS ON HYDROBIOLOGICAL CONDITIONS OF RIVER GOMTI AT SULTANPUR, U.P.

P.R. Singh
Department of Zoology, University of Allahabad, Allahabad (U.P.), India

Received : 08.09.2014 *Accepted : 26.10.2014*

ABSTRACT

River Gomti is an important tributary of Ganga river system. Survey was made at Sultanpur and it was observed that fish and other communities are influenced by hydrological conditions. Valuable major Carps like *Labeo rohita, Catla Catla, Cirrhinus mrigala* have disappeared from fish catches conductivity which a measure of salt content ranged between 250 to 350 μs. DO ranged between 6.8 and 8.6 ppm. High values of DO were recorded during winter months. Highest value of pH was recorded to 8.0. BOD values were found to be higher during monsoon months which may be due to organic pollution and degradation activities.

Key Words: Hydrobiological condition, dissolved oxygen, conductivity, riverine environment.

For the riverine ecosystem hydrobiological conditions are very important as these are directly influencing the aquatic life. Recently due to anthropogenic activities the sustainability of most of riverine ecosystems are badly affected. Infact rivers are very good channels of flowing water and are very good natural habitats of a number of animal and plant species.

Table : Summary of hydrobiological conditions of the river Gomti Sultanpur U.P.

	Air Temp ^{0}C	Water Temp ^{0}C	pH	Conductivity μS	DO PPM	BOD PPM
Jan	14.5	15.6	7.9	303	8.5	3.4
Feb.	15.5	18.0	7.6	290	8.0	3.6
March	20.0	21.9	8.0	350	7.5	3.5
April	22.5	23.2	7.5	300	7.8	3.3
May	30.6	30.0	7.8	310	7.0	3.8
June	43.0	34.0	7.9	300	6.5	4.0
July	40.1	32.5	7.3	250	7.1	4.5
Aug.	28.2	29.5	7.1	265	6.8	4.3
Sept.	27.0	28.0	6.9	251	7.4	3.9
Oct.	24.0	26.5	6.8	280	7.9	3.5
Nov.	20.0	23.5	7.9	320	8.4	3.2
Dec.	14.8	17.8	7.5	335	8.6	3.5

Gomti river is one of the important tributary of the Ganga river system. A number of valuable fish species are inhabiting in this river. Due to organic and chemical pollution a number of hydrobiological parameters are changing rapidly. BOD is increasing due organic pollutants and Dissolved oxygen values have reduced to a considerable extent.

MATERIALS AND METHODS

Hydrobiological parameters were analysed by using portable water quality

analyser. The standard techniques (APHA 1985), Golterman et al, 1978) were followed for the analysis of various parameters during Jan 2002 to Dec. 2002 at Gomti Bridge Sultanpur. Hydrobiological Kits were tested by using some chemical methods of water analysis. Fish species were also recorded during experimental visits.

RESULTS AND DISCUSSION

Standard methods for analysis of hydrological parameter were adopted. Conductivity which is indirect measures of TDS ranged between 250 to 350 μs which may be due to dissolved solids and salt contents (mean values are given in table) High values of BOD was found which is an indication of organic pollution and degradation activities. DO values was recorded higher during winter months and the same was considerably reduced during other months which may be attributed to change in temperature, pollution and photosynthetic activities. Labeo rohita, Catla Catla, Cirrhinus mrigala have disappeared from the riverine fish catch. Fish catch was dominated by cat fishes like Aorichthys aor A. seenghala, A. Vattatus, A. tengra, Ailia Coila, Rita rita, Clupisoma garua, Eutropiichthys vacha. Puntius sophore, P. sarana, P. ticto, Anabas testudineous, colisa saciatus, Gadusia chapra, Gonisalosa monmina, Channa punctatus, Channa marulius and few exotic fishes like Common Carp, were abundantly recorded in the catch. Thus it is clear that fish catch is dominated by cat fishes and trash fishes. Thus it is clear that if a proper attention is not given definitely riverine water will become unfit for a number of living beings. Various workers like Chopra and Hasim (1990), Singh et al (1998) Singh (2014) have studied the impact of human activities on riverine ecosystems and studies indicate that a proper and honest management practices are required for the betterment of riverine ecosxystem.

ACKNOWLEDGEMENT

Author is thankful to MRAG (Marine Resources Assessment group) Ltd., London, United Kingdom for financial assistance.

REFERENCES

APHA (1985). Standard Methods for Examination of Water and Waste Water. 15th Ed. American Public Health Association, Inc, New York.

Chopra, A.K. and Hashim, J. (1990) Him. J. Env. Zool. 4: 158.

Singh, P.R., Pandey SK, Pyne AI, HR Singh, Impact of mass bathing on water quality (1998). Proc. Nat. Acad. SSI. India 66B. 93-95.

Singh P.R. (2014). Studies on hydrobiological conditions of river Ganga at Shivkuti, Allahabad, J. Nat. Reso. Develop. 9(1) : 64-66

Golterman, H.L., Clymo, R.S. and M.A.M. Ohnstad (1978). Methods for Physical and Chemical Analysis of Fresh Waters. Blackwell Scientific Publications, Oxford.

Journal of Natural Resource and Development 9 (2) : 48-57 , 2014

PHYSICO-CHEMICAL AND NUTRITIONAL SIGNIFICANCE OF RICE BRAN OIL AND ITS BLENDS WITH SESAME AND PALM OILS IN PANNER

Archana Mishra
Warner School of Food and Dairy Technology
SHIATS, ALLAHABAD, (U.P.), India

Received : 15.10.2014 *Accepted : 18.11.2014*

ABSTRACT

Highest overall acceptability was found in T_0C_1 (8.51) followed byT_1C_1(8.50), However, the difference in overall acceptability between T_0C_1 and T_1C_1 was found to be non significant. The flavor and taste score of 8.46 in T_0C_1 was found to be most acceptable followed by T_0C_2 (8.38) and T_1C_1 (8.38) . The treatment combination T_1C_1(8.50) was found to be most acceptable in terms of body and texture as it has the highest score of 8.50.The filled milk paneer T_0C_1(8.65) was found to be most acceptable regarding colour and appearance followed by T_1C_1(8.26).

Among the different treatment combinations T_1C_1 paneer contained the highest %age of moisture (53.58), fat (8.34) as well as yied (52.12). The treatment combination T_4C_3 contained the highest %age of protein (7.68). The highest %age of carbohydrate (31.08) was found in the treatment combination T_1C_3. The treatment combination T_0C_3 was found in the treatment combination T_1C_3. The treatment combination T_0C_3 contained the highest %age of ash (0.89). However, the difference was fond to be non significant in all treatment combinations. Among the other treatment combinations the highest total solids %age of 47.70 was found in T_0C_3 to be highest followed by T_2C_3 (47.62).The production cost Rs. 57.72/kg. of the experimental paneer T_3C_1 was less as compared to other treatment combination. The energy value of paneer varied from 223.73 to 228.74. Treatment combination T_0C_3 had the highest energy value.

Key words : Rice bran oil, paneer, palm oil.

India is considered as an agrarian country in which major proportion of population is vegetarian. Milk plays an important role in the diet of such persons as a source of animals proteins. India is the largest milk producer in the world with a production of 112 MT, which increased by 3.3 present in the last fiscal . About half the milk produced is consumed in the liquid form and the remaining is used to prepare products such as ghee, curd, butter, khoa, Paneer, Cheese, Chhana, ice-

cream and milk powders. Paneer is an important indigenous product which is obtained by heat treating the milk followed by acid coagulation using suitable acid viz, citric acid, lactic acid, tartaric acid, sour whey. The whey formed is removed to some extent through filtration and pressing. Paneer represents one of the soft varieties of cheese family and is used in culinary dishes/ snacks. About 5% of milk produced in India is converted in to Paneer**.** According to Prevention of Food Adulteration Act (1954)" Chhana or Paneer is the product obtained form cow or buffalo milk or a combination of these, by precipitation with sour milk, lactic or citric acids. It should not contain more than 10 percent moisture and the milk fat content should not be less then 50 percent of the dry matter."

Researches and medical boards have considered milk fat is a more saturated as compared to vegetable oils containing PUFA. Excessive fat (saturated) intake is a major causative factor in obesity and high blood pressure. Coronary heart disease has been linked of a number of other disorders as well as reports revealed that high dietary fat intake shortens clotting time of blood. High intake of fat increase risk of heart attack because of high proportions of saturated fat in the diet. Many nutritionist believe that if fat intake is reduced to provide less than 30 percent of the calories through fat and oil, dietary fat would not be risk factor at all in heart disease. In view of the increasing occurrence of coronary complications there is considerable interest to reduce / replace the milk fat in paneer with vegetable fat.

Edibles vegetables oils are the major sources of essential fatty acids in the diet. One of the vegetables oils which gained popularity in India in recent times is rice bran oil (RBO). Rice bran oil comes from the thin brown coating between the rice kernel and the protective husk. This coating called 'bran'; bran contains valuable nutritious components such as proteins, vitamins, minerals and lecithin. Oil is extracted from this bran. During the extraction process, oils is carefully separated with the highly valued vitamins intact. As a result the oil is naturally fortified with an abundance of vitamin E, gamma oryzanol and the essential fatty acid. In comparison to other edible oils, rice bran oil has high content of squalene which is reported to be a quencher of singlet oxygen and a free radical scavenger. Thus, rice bran oil is one of the healthiest oil having desirable fatty acid composition with higher oxidative stability along with better cholesterol reducing power than all other edible oils. It contains certain unique micro-nutrients which are important for promotion and maintenance of good health Palm oil is dark yellow to yellow-red oil (high carotene content) of vegetable origin obtained by pressing or boiling the flesh of the fruit of the palm *(Elaeis guineensi)*. Palm oil is rich in carotene from which it derives its bright, tropical, red, colour. In fact carotene content of palm oil is 16 times higher than levels found in a carrot with the same mass and weight. This

makes palm oil one of the main and richest sources of carotene and as such is important in combating vitamin A deficiency common in many developing countries. Sesame oil is of vegetable origin and is obtained from sesame seeds by pressing. Then the sesame plant is similar in type to oil-seed rape and is cultivated in particular in the East Indies. Cold pressed sesame oil is light yellow, has a mild flavour and is odorless whereas hot pressed sesame oil is darker and has a more pungent taste. Sesame oil is known for its healing power.

MATERIALS AND METHODS

The present study was undertaken with the objectives to develop suitable technology for preparation of filled milk Paneer, to assess the feasibility of using filled milk chhana for the preparation of paneer, to optimize level of fat replacement in paneer, to evaluate the organoleptice quality, chemical quality, of filled milk paneer and cost of the product .Three different ratio of milk fat and vegetable oil i.e. 1:0, 1:1, and 2:1, indicated as T_0, T_1, T_2, T_3 and T_4, respectively and three different types of coagulant i.e. sour chhana whey, lactic acid and citric acid indicated as C1, C2 and C3 respectively were used in the present study, Fifteen treatment combinations used in the study namely T_0C_1, T_0C_2, T_0C_3, T_1C_1, T_1C_2, T_1C_3, T_2C_1, T_2C_2, T_2C_3, T_3C_1, T_3C_2, T_3C_3, T_4C_1, T_4C_2, T_4C_3 , were replicated xix times. Sensory evaluation of the prepared paneer was carried out by using the nine point hedonic scale. Product was tested for moisture, fat, protein, carbohydrate, ash and total solids. Yield, energy value and cost of the product were also worked out for different treatment combinations. The data obtained during investigation were statistically analysed by using factorial design and critical difference between combinations.

The materials and methods used for the preparation of Paneer, the analytical proceedings and sequences of operation employed.

Collection of ingredients.

Analysis of milk.

Standardization of Whole milk and Skim milk.

Preparation of Paneer.

Plan of work

Chemical analysis of Paneer

Fat per cent.

Protein per cent.

Carbohydrate per cent.

Ash per cent.

Moisture per cent.

Sensory analysis of Paneer.

Flavour and Taste.

Body and Texture.

Colour and Appearance.

Overall acceptability.

Statistical analysis of data

Yield and Cost of Product

Plan of experiment:

Three different vegetable oil (Rice bran oil, Sesame oil, Palm oil) were used for making

paneer in the present experimental work. Paneer prepared from different treatment combinations were compared with each other. Fat and SNF content milk were at 5.5% and 8.5% respectively in all treatment combinations.

The different combinations used in the experiment were represented as follows:

Notation

T_0 : Paneer (fat and SNF %) from milk.

T_1 : Paneer prepared from filled milk containing Rice bran oil.

T_2 : Paneer prepared from filled milk containing Sesame oil.

T_3 : Paneer prepared from filled milk containing Palm oil.

T_1c_1: Paneer prepared from filled milk in which 50% milk fat was replaced by Rice bran oil.

T_2C_2: Paneer prepared from filled milk in which 50% milk fat was replaced by Sesame oil .

T_3C3: Paneer prepared from filled milk in which 50% milk fat was replaced by Palm oil.

T_1R_1: Paneer prepared from filled milk in which 25% milk fat was replaced by Rice bran oil.

T_2R_2: Paneer prepared from filled milk in which 25% milk fat was replaced by Sesame oil .

T_3R_3: Paneer prepared from filled milk in which 25% milk fat was replaced by Palm oil.

Sensory evaluation of Paneer

Sensory evaluation of Paneer was done on the basis of organoleptic tests by panel of five judges using hedonic score card based on the 9 point hedonic scale, scores were allocated for various parameters like flavour and taste, body and texture, colour and appearance and overall acceptability of filled milk paneer.

Flavour and Taste scores.

Body and Texture scores.

Colour and Appearance scores.

Overall Acceptability.

Statistical analysis of data

The experimental design used will be (6×6×2) factorial. Statistically analysed using analysis of variance and three way classification with replication($r_{1)}$ = 6, observation per experiment.

1. No. of Treatment : 12
2. No. of Replication : 06
3. Total Treatment combinations : 72

The standards error of mean and critical difference at 5% and 1% level of significance will be also used

RESULTS AND DISCUSSION

This chapter deals with the results obtained during the experiments of the research work. the chemical composition and organoleptic parameters of filled milk Paneer was studied. various experiments were conducted to obtain optimum values of the different parameters for good quality of Paneer. The finding are also illustrated

diagrammatically. The results obtained from the analysis during the course of investigation are presented in this chapter and discussed in detail, in the following sequences:

Chemical evaluation of filled milk Paneer

- Moisture percent
- Fat percent
- Protein percent
- Lactose percent
- Ash percent
- Total solids percent

Organoleptic evaluation of Paneer

- Flavour and Taste scores.
- Body and Texture scores.
- Colour and Appearance scores.
- Overall Acceptability.

Statistical analysis of paneer

Yield and Cost of product

Moisture percent in Paneer

The average percent moisture in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 51.18, 52.25, 51.42, 51.38,52.48, 51.25, 52.30, 52.58, 51.18, and 51.26 respectively. The average percent moisture in paneer sample T_1R_1 (52.58) was higher than other samples.From the ANOVA table , it was observed that the moisture percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 5200.06, due to oil (O) = 10366.06, as well as due to interactions between oil & cocentration (O×C) = 4366.67, are greater than their respective table value F at 5 percent as well as 1 percent probability level. Hence, it can be concluded that there is high significant difference. Whereas, the calculated value of F due to concentration is less than its respective F values at 5percent as well as 1 percent probability levels. Therefore, it can be concluded from the experimental data that there is non significant difference between concentration.

Fat in Paneer

The average percent Fat in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 25.68, 24.68, 25.54, 25.64, 24.76, 25.67, 24.60, 24.58, 24.55 and 25.50 respectively. The average percent fat in paneer sample T_0 (25.68) was higher than other samples.From the ANOVA table , it was observed that the fat percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 2205.969, due to oil (O) = 4226.494, Due to concentration (C) = 812.2072 as well as due to interactions between oil & concentration (O×C) = 1660.294, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Hence, it can be concluded that there is high significant difference .

Protein Content in Paneer

The average percent protein in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 18.69, 18.71, 18.61, 18.61, 18.55, 18.67, 18.70, 18.55, 18.62 and 18.60 respectively. The average percent Protein in paneer can be observed that the sample, T_0

(18.69)was higher than other samples. From the ANOVA table , it was observed that the Protein percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 100.05, due to oil (O) = 116.05, due to concentration (C) =60 as well as due to interactions between oil & concentration (O×C) = 106, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Hence, it can be concluded experimental data that there is high significant difference.

Lactose in Paneer

The average percent Lactose in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 2.51, 2.43, 2.49, 2.41, 2.30, 2.46, 2.48, 2.40 and 2.49 respectively. The average percent in paneer can be observed that the Lac tose T_0 (2.51) was higher than other samples. From the ANOVA table , it was observed that the Lactose percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 12.05, due to oil (O) = 214.05, Due to concentration (C) = 28.33 as well as due to interactions between oil & cocentration (O×C) = 114.6, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant effect .

Ash in Paneer

The average percent Ash in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 1.94, 1.93, 1.94, 1.96, 1.91, 1.95, 1.92, 1.90, 1.90 and 1.89 respectively. The average percent Ash in paneer sample T_1 (1.93) was higher than other samples. From the ANOVA table , it was observed that the Ash percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 49.07 due to oil (O) = 37.78, as well as due to interactions between oil & concentration (O×C) = 30.28, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is significant effect .Whereas the calculated values of F due to concentration (C) = 125.08 greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is significant difference.

Total solids in Paneer

The average percent Total solids in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 48.82, 47.75, 48.58, 48.62, 47.52, 48.75, 47.70,47.42, 48.82 and 48.74 respectively.The average percent Total solids in paneer sample T_0 (48.82) and T2R2 (48.82) are similar and higher than other samples. From the ANOVA table , it was observed that the Total solids percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 11022 due to oil (O) = 14252, due to concentration (C) = 14117 as well as due to interactions between oil & concentration (O×C) = 8375, are greater than their respective table value of F at 5 percent as

well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference.

Flavour and taste in Paneer

The average percent Flavour and taste in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 8.42,6.57,5.85,6.42,7.00,6.85, 6.57,7.85,7.85 and 8.28 respectively. The average percent Flavour and taste in paneer sample T_0 (8.42) was higher than other samples. From the ANOVA table , it was observed that the Flavour and taste percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 31022 ,due to oil (O) = 54049, due to concentration (C) = 62271 as well as due to interactions between oil & concentration (O×C) = 9093, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference .

Body and Texture in Paneer

The average percent body and texture in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 8.57, 7.86, 7.14, 6.57, 7.00, 7.00, 6.86, 7.14, 7.57 and 8.14 respectively.The average percent body and texture in paneer sample T_0 (8.57) was higher than other samples.From the ANOVA table , it was observed that the body and texture percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 17000 ,due to oil (O) = 40643, due to concentration (C) = 7884as well as due to interactions between oil & concentration (O×C) = 8217, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference .

Colour and Appearance in Paneer

The average percent colour and appearance in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 8.57, 8.00, 7.29, 7.57, 7.89, 8.15, 8.28, 7.34, 7.78 and 7.99. respectively. The average percent colour and appearance in paneer sample T_0 (8.57) was higher than other samples.From the ANOVA table , it was observed that the colour and appearance percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 4614 ,due to oil (O) = 10354, due to concentration (C) = 3422 as well as due to interactions between oil & concentration (O×C) = 2141, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference .

Overall Acceptability in Paneer

The average percent overall acceptability in paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were 8.43,7.91,8.50,8.42,7.87, 8.43,8.37,7.64,8.34 and 8.38. respectively. The average percent

overall acceptability in paneer sample T_2 (8.50) was higher than other samples.From the ANOVA table , it was observed that the overall acceptability percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 2740 ,due to oil (O) = 9408, due to concentration (C) = 483.2 as well as due to interactions between oil & concentration (O×C) = 159, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference .

Yield of Paneer

The average percent yield of paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were. respectively. 20.69, 20.67, 20.25, 20.14, 20.21, 19.97, 20.38, 20.11, 20.05 and 19.89.The average percent yield of paneer sample T_0 (20.69) was higher than other samples. From the ANOVA table, it was observed that the yield percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 2985 ,due to oil (O) = 7258, due to concentration (C) = 2073 as well as due to interactions between oil & concentration (O×C) = 1152, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference .

Cost of Product

The average percent cost of paneer samples T_0, T_1, T_2, T_3, T_1C_1, T_2C_2, T_3C_3, T_1R_1, T_2R_2, and T_3R_3, were. 150.5, 100.70, 100.61, 110.56, 100.09, 100.89, 108.92, 100.70, 100.99 and 108.50 respectively.The average percent cost of paneer sample T_0 (150.5) was higher than other samples. From the ANOVA table , it was observed that the cost percentage in Paneer samples reveals that the calculated values of F due to treatment (T) = 68225.09 ,due to oil (O) = 250136.78, due to concentration (C) = 325.844 as well as due to interactions between oil & concentration (O×C) = 986.5929, are greater than their respective table value of F at 5 percent as well as 1 percent probability level. Therefore, it can be concluded from the experimental data that there is high significant difference . Similar observation made by Srilakshmi (2002), Srinivasan and Anantatrisham (2004), Venkateswarly, et. al. (2003), Zobkova et. al. (2007), Anita and Abraham (2000).

CONCLUSION

On the basis of results obtained in the present investigation, it was concluded that the different treatment combinations of filled milk paneer on the basis of overall acceptability was found to be best combination ratio was T_1R_1 (2:1).

The chemical properties of different treatments of products varied to a great extent.

The cost of the products was found to be satisfactory, whereas the prepared filled milk paneer was acceptable. Therefore,

it was concluded that skim milk and rice bran oil ratio (T_1R_1 = 2:1)was found to be the best for preparing good quality of paneer.

ACKNOWLEDGEMENTS

First and Foremost, I would like to express my deepest sense of gratitude to almighty God for His loving care and enabling me to accomplish this venture With an almost degree of sincerity, I avail this opportunity to express my heartfelt thanks to my able and worthy advisor Prof. (Dr.) Ramesh Chandra, Dean, Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed to be University) Allahabad for his keen interest, valuable guidance, consideration, criticism, and unceasing encouragement throughout the research work. Without his interest and deep involvement, my research work could not have been successfully completed. I think words would not be enough to depict on this paper, my feelings about my beloved father Mr. Amar Nath Mishra and my mother Mrs. Vijay Laxmi Mishra and my Husband Mr.PankajPandey for their love, blessing, continuous encouragement and inspiration which helped a lot to groom my personality to face the world boldly, They are pillar of strength and inspiration which makes me to strive for bright future.

I also express my deep sense of gratitude and sincere thanks to all those who helped me directly in the course of my studies, investigation and preparation of documents. Lastly. I would again like to thanks the omniscient and the omnipresent power of the universe, the Almighty.

REFERENCES

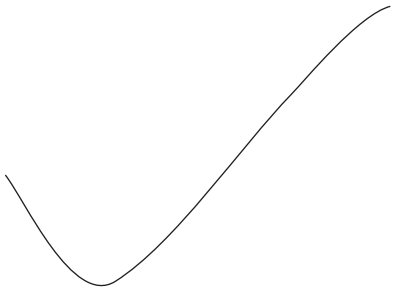
Srilakshmi, B (2002) : Food science, 4th Edition, New Age International Publishers, New Delhi PP-247-25.

Srinivasan, S. and Anahtatrishnam, C.P. (2004). In the effect of milk on cholesterol metabolism. M.Sc. dissertation Kurukshetra University, Kurukshetra.

Venkateswarly, U. ; Reddy, Y.K. and Shiv Kumar (2003) : preparation of filled milk paneer by incorporating coconut milk, Indian J. Dairy sci, 56(6) 352-358.

Zobkova, Z.S. ; Scheherbakova, S.A ; Zenina, D.V and Teteruk, A.P. (2007). Vegetable oils in the school children nutrition, Molochhaya-prompshenhots, (6) 38-39.

Anita F.P. and Abraham, P. (2000). Coronary heart disease and atheroseherosis ; 395-414.



Journal of Natural Resource and Development 9 (2) : 57-59 , 2014

AGRICULTURAL LAND QUALITY ZONES AND LAND USE EFFICIENCY IN BALLIA DISTRICT: A SPATIAL ANALYSIS

Sanjay Kumar Tripathi
Department of Geography
S. M. M. Town P. G. College, Ballia- 277001.

Received : 25.06.2014 *Accepted : 29.07.2014*

ABSTRACT

The existing paper deals the spatial analysis of agricultural land quality and their relation to land use efficiency. The satellite data in the present investigation has been used to delineate and map out the various zones of agricultural land quality. The land use efficiency has been measured based on the ranking co-efficient method. The five variables taken into consideration for ranking co-efficient i. e. (i) net shown area (NSA), (ii) uncultivable waste land, (iii) cultivable waste land, (iv) irrigated area and (v) area cropped more than once.

Key Words: Agricultural land quality, land use effiecency.

The quality of agricultural lands is influenced by various physio – cultural and socio – economic factors in a region (Mishra and Chobey, 1999). In Ballia district, physiography, drainage, geomorphic feature, soil, vegetation cover etc. are the controlling factors which govern the nature of agricultural land. The socio – economic and cultural factors on the other hand, generate the circumstances to increase or decrease the land quality. Establishment of settlements and their expansion, extension in canal and road network, garden /groves / tree plantation, chocking of natural drain and resulted problems of water logging and 'usar' formation, creation of infrastructure base etc. may be accounted as the affecting constituents of agricultural land quality (Tripathi, 2001, Tripathi2008). Land use efficiency is a critical appraisal of land resource utilization needs a scientific exploration for such aspect as to how efficiently has land been utilized. The land use efficiency may be defined, the particular land unit produced in response to the successive unit of capital and inputs that are combined with them in production process (Barlowe and Johnson, 1954). The intensity of land use revel the degree of land use development but land use efficiency is control to all discussion of land problems and policies (Barlowe and Johnson, 1954).

MATERIALS AND METHODS

The satellite image is a powerful tool to represent a sum of the total picture of an area. The images are formed by recording the reflectance of various objects of earth's surface at the time of satellite pass. The satellite data (google earth web site image) in the present investigation has been used to delineate and map out the various zones of agricultural land quality taking into account physical and cultural factors as marked on satellite imagery. These zones are identified and categorized as: (i) very good, (ii) good, (iii) moderate, (iv) poor and (v) very poor agricultural land quality.

In the present study, the land use efficiency has been measured based on the ranking co-efficient method (Singh, 1977). The five variables taken into consideration for

ranking co-efficient i. e. (i) net shown area (NSA), (ii) uncultivable waste land, (iii) cultivable waste land, (iv) irrigated area and (v) area cropped more than once. The percentage of NSA, irrigated area and area cropped more than once, signify the favorable condition for agricultural development, they have assigned the ranks in descending order. On the other hand the percentage of cultivable waste land and uncultivable waste land represents unfavorable condition hence these variables have been given ranks in ascending order. Dividing the total ranking of each blocks by number of variables, the ranking co-efficient have been obtained.

RESULTS AND DISCUSSION

Spatial Distribution of Agricultural Land Quality Zones

The very good quality of agricultural land is characterized with the intensive cultivation and very good harvesting efficiency. It can be identified and delineated on satellite imagery by very dark tone and smooth texture. The very good quality of agricultural land is registered in Siyar (4.00 %) and Sohawn (15.13 %) blocks. The good quality of agricultural land has been identified by light and fine to moderate texture. It has occupy highest in Rasara (73.20 %) block. The moderate category of agricultural land quality is characterized with mixed tone because of reflectance variation, caused by mixed objects (such as cultivation, settlements, trees, brick industries etc.) and moderate to coarse texture. It has occupied highest area in Reoti (58.54 %) block. The poor quality of land is recorded highest in Chilkahar (23.66 %) block whereas very poor quality of agricultural land marked in Belahari (62.60 %) block (Fig. 1 and Table 1).

Table 1 : Agricultural Land Quality Zones in Ballia District (GIS Analysis Based on Remote Sensing Data) (In Percent)

Block	Very Good	Good	Moderate	Poor	Very Poor	Total
Siyar	4.00	61.33	32.00	2.67	-	100.00
Nagara	-	68.26	13.17	5.39	13.17	100.00
Rasara	-	73.20	9.15	5.23	12.42	100.00
Chilkahar	-	60.22	6.45	23.66	9.68	100.00
Nawanagar	-	64.00	24.00	11.00	1.00	100.00
Pandah	-	65.91	7.95	-	26.14	100.00
Maniyar	-	70.87	12.62	9.71	6.80	100.00
Baruarbari	-	44.00	28.00	8.00	20.00	100.00
Bansdih	-	38.82	20.00	15.23	25.88	100.00
Reoti	-	10.57	58.54	18.70	12.20	100.00
Garawar	-	52.00	21.33	6.67	20.00	100.00
Sohawn	15.13	26.89	31.93	-	26.05	100.00
Hanumanganj	-	10.14	39.13	1.45	49.28	100.00
Dubahar	-	-	39.19	18.92	41.89	100.00
Belahari	-	-	29.27	8.13	62.60	100.00
Bairiya	-	-	27.38	65.48	7.14	100.00
Murlichhapara	-	-	37.96	45.37	16.67	100.00

LAND USE EFFICIENCY

The high land use efficiency observed in 12 blocks Siyar, Nagara, Rasara, Chilkahar, Nawanagar, Pandah, Maniyar, Baruarbari, Reoti, Garwar, Belahari, Bairiya in 1995 – 96 and 11 Siyar, Nagara, Rasara, Chilkahar, Nawanagar, Pandah, Bansdih, Reoti, Garwar, Sohaw, Hanumanganj blocks in 2005 – 06. The

fundamental factors of high efficiency are NSA, higher proportion of irrigated land and higher percentage of area shown more than once (Fig 2 and Table 2).

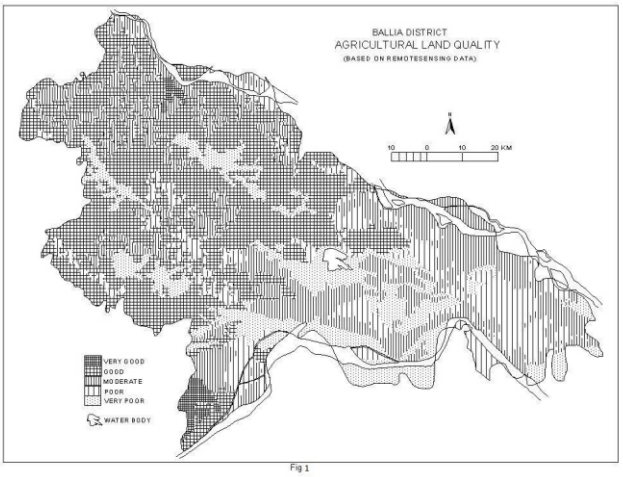


Fig 1

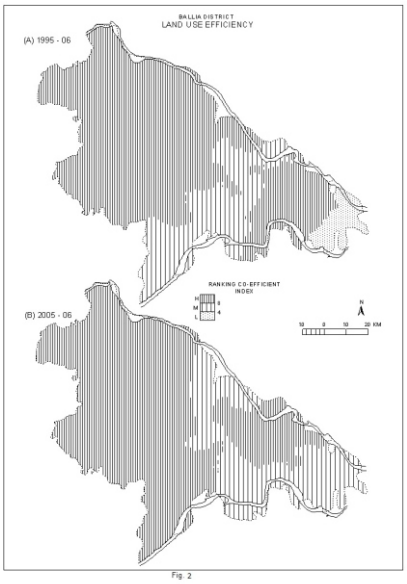


Fig. 2

Table 2 : Land Use Efficiency in Ballia District – 2005 – 2006

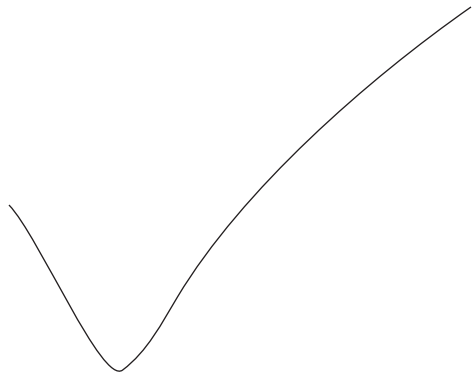
Type	Ranking Score Index	1995 - 96		2005 – 06	
		No. of Blocks	Name of Blocks	No. of Blocks	Name of Blocks
High	> 8	12	Siyar, Nagara, Rasara, Chilkahar, Nawanagar, Pandah, Maniyar, Baruarbari, Reoti, Garwar, Belahari, Bairiya.	11	Siyar, Nagara, Rasara, Chilkahar, Nawanagar, Pandah, Bansdih, Reoti, Garwar, Sohaw, Hanumanganj.
Moderately	4 to 8	4	Bansdih, Sohaw, Hanumanganj, Dubahar.	6	Maniyar, Baruarbari, Dubahar, Belahari, Bairiya, Murlichhapara.
Low	< 4	1	Murlichhapara.	-	-

REFERENCES

Barlowe, R. and Johnson, U. bu. (1954), Land Problem and Policies, Hill Book Co. Inc., New York.

Mishra, S. P. and Chaubey, S. K. (1999), Geomorphic features and their relation with agricultural land quality: A case study of Chahania Block, Chandauli district, U. P., Transactions, Vol. 21, No. 2, 23-34.

Tripathi, S. K. (2001), Geographical Study on Agricultural Development Problems and



Journal of Natural Resource and Development 9 (2) : 60-63 , 2014

STUDY OF EMOTIONAL INTELLIGENCE IN RELATION FOR SOCIAL ADJUSTMENT OF NORMAL AND DIFFERENTLY ABLED STUDENTS

Stuti Mishra
Department of Education
SHIATS, Allahabad - 211007 (U.P.) India.

Received : 20.07.2014 *Accepted : 23.09.2014*

ABSTRACT

Nowdays, Emotional intelligence it will be having grater impact social adjustment in our society. In today's scenario varies greatly. When we corelated emostional intelligence and social adjustment of normal and differently abled girls students there was no significant difference among them, similar was the case with boys.

But it is really very surprising when I found completed my research that there is huge difference among girls and boys normal and differently abled students regarding their social adjustment we must tales speual care, otherwise it would lead to problem, which will be beyond the bound for us to solve.

Key words : Emotional intelligence, normal, abled.

At the time is going on today life of human beings become more complex and hectic if the person is able to solve problems in life, whatever it comes. Then only he can adjust himself in his social environment. Various school contain variety of students i.e. normal and special school's at secondary level involve variety of students having different emotional and health status. The student who is fit either at physical or mental level, have high living standard resulting high social standard. Emotions effect greatly mental level of student's emotional intelligence effect greatly social environment that have great impact on future of students.The normal and differently abled adolescence adjustment and characterized as a period of change not only in terms of individual physical and cognitive development but also in term of the change that occur in the adolescence social context. Social adjustment, in psychology, the behavior process by which humans and other animals and maintains as equilibrium among their various needs or between their need and abstracts of their environments. Emotional intelligence can be learned and strengthened while others claim it is an in born characteristics, students face many adjustments in college from year to year.

Researchers in special education are concerned about the social validity of their studies are they in investigating sociality

significant variables are methods used to change student performance acceptable did the changes observed make any real difference in the child life ? (Imran Akram and Mohammad AkramNasim 2010) who better than parents to identify meaning full home and community and let researchers know if their ideas and finding have any real validity.

MATERIALS AND METHODS

The present study was conducted in order for determine the adjustment of 50 girls and 50 boys in general and handicapped schools was selected for the study. 100 students of girls and 100 students of boys in general and handicapped schools were taken by giving them questionnaire to fulfill in a given time of about 30-35 minutes. The questionnaire was divided into four areas of social adjustment and emotional intelligence data was analyzed by using SPSS.

Research design is the plant structure and strategy of investigation conceived as the obtain answers to research question and control variance the plan is the overall scheme or programme of research Dr. S.K. Mangal and Ms., ShubhraMangal.

Descriptive research deals with the present status of phenomenon under study. It tried to answer through the analysis of variable relationship. The present investigation can be called a comparative study also. The study is descripted school survey with composite characteristic of normal and differently abled students between emotional intelligence and social adjustment.

The data collected for the study were organized and analyzed as required for this study. The objectives of the study were the main basis.

Differently Abled Students

School	No. of Student	Boys	Girls
Muk Evam Badhir Vidyala, Gorge Town, Allahabad, Uttar Pradesh	37	12	25
Muk Evam Badhir Vidyala, Naini, Allahabad, Uttar Pradesh	63	50	13

Normal Students

School	No. of Student	Boys	Girls
Crosthwait Girls Inter College, BaikaBagh, Allahabad.	25	-	25
JagatTaran Girls Inter College, Gorge Town, Allahabad	25	-	25
Colonalganj Inter College, Colonalganj, Allahabad	25	25	-
SishuSangam Krishna Nagar, Kydganj, Allahabad	25	25	-

Scores have no meaning unless, some appropriate statistics is applied to them and result is described by analyzing and interpreting the data for this statists like co-relation was applied.

Statistical Analysis :-

$$\text{Correlation} = \frac{1 - \Sigma d2}{N} \quad \text{x N-1}$$

Σd^2 = Sum of the squares of differences in rank

N = Number of pairs.

RESULTS AND DISCUSSION

1. There is a relationship between emotional intelligence and social adjustment of boys.

Gender	Variable	Correlation
Boys	Normal	0.0034
	Differently abled	0.17

It is clear from the above table that the correlation value of normal and differently abled boys 0.0034 and 0.17 for df = 0.138 is level of significant is more than the table value hence. The null hypothesis is that there is no significant relationship between emotional intelligence and social adjustment in normal and differently abled boys therefore is first hypothesis is rejected.

2. There is a relation between emotional intelligence and social adjustment of girls.

Gender	Variable	Correlation
Girls	Normal	0.01
	Differently abled	0.28

It is clear from the above table that the correlation value of normal and differently abled girls 0.01 and 0.28 for df = 0.138 is level of no significant is more than the table value. Hence the null hypothesis is that there is no significant relationship between emotional intelligence and social adjustment in normal student therefore no significant difference therefore is significant different in differently abled girls. An observation of the correlation of the above table showed that emotional intelligence in relation social adjustment of normal and differently abled girls in significant. Hence therefore second hypothesis in normal girls is rejected and differently abled girls is accepted.

3. Co-relation between emotional intelligence and social adjustment of normal and differently abled students.

Variable	Co-Relation	Level
Normal	0.01	0.138
Differently abled	0.47	

It is clear from the above table that the correlation value of normal and differently abled student 0.01 and 0.47 for df = 0.138 is level of no significant is more than the table value. Hence the null hypothesis is that there is significant relationship between emotional intelligence and social adjustment in normal differently abled girls and observation of the correlation of the above table showed that emoitional intelligence in relation to social adjustment of normal and differently abled

students in significant. Studies emotional intelligence among male and female differently abled B.Ed. students and found no significant difference in the emotional intelligence or male and female students.

To find out social adjustment and emotional intelligence the co-relation between normal and differently abled girls and boys. There is no significant difference in the total level of social adjustment and emotional intelligent.

Variable	Value of correlation
Social adjustment and emotional intelligence of normal boys	0.0034
Social adjustment and emotional intelligence of normal girls	0.01
Social adjustment and emotional intelligence of differently abled boys	0.17
Social adjustment and emotional intelligence of differently led girls	0.28

There is significant difference normal and differently abled boys and girls in emotional intelligence and significant differences in 0.138 level normal and differently abled boys in social adjustment and no significant between normal and differently abled girls in social adjustment. Similar observation mode by Lone (2008), Maghsoudi (2010), Antonaxi (2011), Balu (2012) and Fabio (2011).

ACKNOWLEDGEMENT

The present research work has passed through the planning conducting and reporting stages during which direct and indirect help of many persons and institutions have been taken first of all, I would like to express my gratitude to almighty god and my parents. I would like to thanks my advisor, Asst. Prof. Mrs. Kirti Cutting Allahabad School of Education for her benevolent guidance constant encouragement and appropriate suggestions. This work was possible due to the co-operation of many girls and boys general schools and handicapped schools in collecting data.

REFERENCES

Lone K.K. (2008). Academic performance of students with emotional and behaviour education P.P 43-62.

Maghsoudi J. (2010). The effect of aequiring life skills through humor social adjustment vol. 15(4) P.P. 142-157.

Antonaxi J. (2011). Mare on testing for validity instead of looking for it personality and individual differences 50(3) 418-421.

Balu A. (2012). Suicidal behaviour patients dus when Adom 25(1) 58-62.

Fabio A.D. (2011) : Emotional Intelligence and perceived social support among Italian high school students Vol. 39 P.P. 461-476

Journal of Natural Resource and Development 9 (2) : 64-67, 2014

FUNCTION AND AVAILABILITY OF MICRONUTRIENTS IN ANIMAL PRODUCTS FOR HUMAN NUTRITION

Sheetla Prasad Verma
Department of Animal Husbandry and Dairying
K.A.P.G. College, Allahabad - 211 001 (U.P.), India

Received : 10.03.2014 *Accepted : 15.04.2014*

ABSTRACT

It is important incorporate the dishes of animal origin in out daily diet, but earlier its objective was supply of proteins of animal source only. Later on, researches in nutrition science at micro level induced to study the function of micronutrients in human body. So, to perform proper homeostasis and healthy function of human body, it is necessary to aware about the availability of micronutrients in all easily available animal products. This study has been made to serve the purpose.

Key Words : Micronutrients, animal products, nutrients.

Micronutrients are vital for proper functioning of all of our body system. These micronutrients are such as Fe, Zn, and vitamin A all present in meat, while Ca, CLA (Conjugated linoleic Acid), Riboflavin and Vitamin B_{12} are present in milk. These micronutrients are discussed below:

(A) Requirement and function of micronutrients

Iron (Fe) : It produces RBCs. It's failure can result anemia which can lead to tiredness and weak immune system. It is required for cell growth, production of energy and formation of WBC (White blood corpuscles) antibody. So, it protects our body form diseases. Our body requirement for Fe is 10-18 mg/day. For the purpose, animal products like meat, fish, sea food and poultry products are good source. Bio-availability of haem iron from meat is much higher than form plants, because folic acid is nearly ten times more in liver and eggs compared to vegetables (Biesalski, 2005).

Copper (Cu) : Human body needs 2-3 mg copper/day. It is important for body cells to use energy present in fat, carbohydrate and proteins. It helps in formation of hemoglobin and to develop bone and cartilage. Its deficiency create digestive problem and weakness in body. Fish, poultry, beef and meat are good source of copper.

Iodine (I) : Human body needs 2-3 mg Iodine/day. It helps to develop thyroid gland and function. Iodine also helps in fat metabolism, energy productions and growth.

Zinc (Zn) : Human body needs 15 mg zinc/day. Zincs support immune system. It is the part of various enzymes. It helps in healing of wounds and in fighting of infection. It is essential for growth, maturation and tissue repair. Dairy products, meat, poultry and sea food are good source of Zinc. .

Chromium (Cr) : Chromium regulate blood glucose level and hunger. It protects De-oxy-ribo-nucleic acid (DNA) and controls blood fat and cholesterol level. Chromium deficiency may lead cold sweats, frequent hunger and constant desire to eat and drink.

Sodium (Na) and Chlorine (Cl) : Sodium maintains proper fluid balance and helps fluid pass through cell wall and regulate blood pH. Chlorine regulate water and electrolytes within cell. It also helps in maintaining cellular pH.

Manganese (Mn) : It helps in bone formation and in metabolism of proteins, carbohydrates and fats.

Selenium (Se) : Human body requires o.02-0.2 mg selenium/day. Meat, chicken, egg and fish are excellent source. Selenium act as antioxidant and enhances thyroid functions. It promotes liver health and prevent certain types of cancers.

Magnesium (Mg) : Magnesium helps n conversion of glucose into energy. It also helps in maintaining normal rhythm of heart.

Vitamin 'A' : It is a fat soluble vitamin and available in Cod liver oil in very rich quantity. It is necessary for normal vision, growth & strong immune system.

Vitamin 'B_{12}' : Allen et al (1995) suggested that it is necessary for the formation of normal blood and for neurological developments and function. It is important to synthesize nucleic acid (purines and pyramidines) synthesis of proteins from amino acid and for metabolism of fat and carbohydrates.

(B) : Availability of Micronutrients in Animal products:

Milk : Milk is the good source of Ca, Mg, P, K, Se, Zn, Nacl, Ca $(PO_4)_3$. Buffalo milk is richer in terms of Ca, Fe, and P content.

Meat : Meat is rich in vitamin B_{12} and Fe. Lean red meat is an excellent source of vitamin B_{12}, niacin, vitamin B_6, Fe, Zn, P and riboflavin, pantothenic acid, Se and Vitamin D, a range of endogenous antioxidants and other bioactive substances like taurien, carnitine, carnocine, Ubiquinone, Glutathione and creatine. Mutton is richest source of P, Fe, Cu, Vitamin B_6, B_{12} and thiamin. Red meat is good source of Se. The iron in meat is mostly haem-iron, which is well absorbed as meat protein enhances the absorption of iron form meat. In the same way absorption of Zinc form a diet high in animal protein is greater than from plant foods. Red

meat is good source of Na, P, K and Ca. Red meat also supply chromium, Cu, Mg, K, Se, folic acid, Vitamin D and K.

Fish : Fishes are good source of Fe Ca, Se, Mg, P and K. Fish are recommended to incorporate in the diet of women. Regular intake of fish may avoid ossteoporosis (Murray and Burt 2001)

Table- 1 Mineral Composition (mg/100g) of certain animal products :

Minerals	Milk	Beef	Mutton	Chicken	Lamb	Fish muscle
Ca	120	4.5	6.6	14	7.2	792
Mg	12	25	28	28	28	38
Na	48	51	71	43	69	72
K	157	363	365	309	344	278
Fe	0.1	1.8	3.3	1.1	2.0	1.55
Zn	0.38	4.6	3.9	0.74	4.5	0.96

Source : A.K. Garg and M. Dubey, 2014.

Chicken and Turkey Breast : Chicken breast contains about one tenth of Na than Turkey breast. Chicken breast can help to stabilize the blood pressure. Lean breast of chicken provide relatively more Se (>25%) than beef, lamb and pork and more Mn (>90%) than lamb (Probst 2009).

Table- 2 Mineral Composition (mg/100g) of eggs white and egg yolk :

Minerals	Egg White	Egg Yolk
Ca	7.0	149
P	15	600
Mg	11	12
Na	166	52
K	163	124
Fe	0.1	6.2
Zn	0.04	4.0
Cu	0.04	0.16
Mn	0.00	0.11
Se	0.02	0.06
I	--	0.13

Source : A.K. Garg and M. Dubey, 2014.

Eggs : Eggs of ducks, quails and turkeys have higher mineral content as compared to chicken eggs. Table 2 shows that egg white contain minerals such as Ca, P, K, Zn, Fe and Cu, Egg yolk is more rich Source of all the nutrients including vitamin and minerals. (Roe at al, 2013) than egg white. All the fat soluble vitamins (A, D, E and K) are found in the egg yolk. It is recommended that eggs should not be eaten in large amounts, if any body can not tolerate too much Na, as egg is very rich source of Na.

REFERENCES

Allen, L.H., Rosado, J.L., Casterline, J.E., Martinez, H.Lopez, P. Munoz, E and Black, A.K. (1995) : Am. J. Clin. Nutr. 62: 1013-1019.

Biesalski, H.K. (2005) : Meat Science 70 : 509 – 524

Garg A.K., and Dubey, M. (2014) : Nutrition, Productivity and Product Quality in farm animals, Pub. CASAN, IVRI Barellei, 114-115

Murray, J and Blurt, J.R. (2001) : The composition of fish. Ministry of technology. Torry research station. Torry Advisory note no. 38. http:\wwwfao.org./wairdocs/ tan/ x5916E/ x5916Eoohtm.

Probst, Y. (2009) : Nutient composition of chicken meat. Pub. No. 08/210. Rural industries research and development corporation. Australia.

Roe, M, Pinchen, H. Church, S and Paul F (2013) : Analytical report (revised version).