

EFFECT OF MINERAL SUPPLEMENT ON MILK PRODUCTION, MILK COMPOSITION, AND COST-BENEFIT RATIO IN LACTATING MURRAH BUFFALOES

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ABSTRACT

The present experiment was conducted at a dairy farm during 2017 - 18 C.S.A. University of agriculture and technology Kanpur. Effect of the mineral supplement on milk production in Murrah buffalo Twelve Murrah buffalo was selected for study on milk production and milk composition trial. For more performance a balanced mineral is essential. A shortage of or imbalance in the supply of energy, protein, vitamins, and minerals will subject the buffalo the mineral supplement stress resulting in a decrease in milk production. Milk production average per week was 24 ± 715 , 25 ± 310 , and 25 ± 817 liter in T0, T1, and T2 groups respectively. Significantly higher was observed in the T2 group compared to other groups of Murrah buffaloes. The fat content average in the week was 7 ± 045 , 7 ± 090 , and 7 ± 950 cent in T0, T1, and T2 Group respectively, group T2 was highly significant as compared to other groups. The lactose content average in the week was 5 ± 045 , 5 ± 070 and 5 ± 092 percent in T0, T1, and T2 Group respectively, group T2 was highly significant as compared to other groups, The protein content average in the week was 4 ± 036 , 4 ± 052 and 4 ± 085 percent in T0, T1 and T2 Group respectively, group T2 was non-significant as compared to other groups. The total solid content average in the week were 16 ± 840 , 16 ± 855 , and 16 ± 903 percent in T0, T1, and T2 Group respectively, group T2 was highly significant as compared to other groups. The SNF content average in the week was 9 ± 480 , 9 ± 503 , and 9 ± 515 percent in T0, T1, and T2 Group respectively. Group T2 was non-significant as compared to other groups. The water content average per week was 83 ± 137 , 83 ± 037 , and 82 ± 958 percent in T0, T1, and T2 Groups respectively group T2 was highly significant as compared to other groups. The ash content average in the week was 0 ± 738 , 0 ± 750 , and 0 ± 770 percent in T0, T1, and T2 Group respectively, group T2 was highly significant as compared to other groups. From the present study,

it can be concluded that 50gm and 75 gm mineral supplement fed to milch buffaloes as recommended by the manufacturer can be the mineral supplement for obtaining optimum milk production in Murrah buffaloes and increase milk composition buffaloes.

Keywords : Mineral supplement, milk fat, Murrah buffaloes, milk production, and milk composition

INTRODUCTION

Buffalo Murrah in India was started as early as 2200B.C. when the Murrah breed was started to have been evolved around Hissar, Panjab, and Delhi region using round horn bull on native buffalo. Murrah buffalo's origin place is the Delhi region and Panjab. But animal a is a pure breed in U. P., Rajasthan and other places Rohatak in Panjab is a well-known market from where thousands of high yielders are exported, Characters of Murrah buffalo is the deep massive frame with short let it has short characteristic tightly curled horns; well-developed udder and a long tail the popular color is jet black with white markings on the tail, Face, and extremities. The skin is soft, smooth with scanty hair. The bodyweight of bulls amounts on average to 550k. Developing countries like India, Srilanka. Thailand, Malesia, and Pakistan are between 1500 - 2000 kg. India's per lactation yield 1600 - 2500 kg more then as against to 2600kg per lactation as the world average. energy demand is very high during early stage of lactation but supply does not commensurate with demand thus affecting the production potential of animals (Sirohi et. al., 2010). Hence, during early lactation, dairy animals are often forced to draw on body reserves to satisfy energy requirements thereby leading to a substantial loss in bodyweight which adversely affects production, resulting in lower yield (Kim et. al., 1993). Inclusion of unprotected fat in the dairy ration is limited to 3% of dry matter (DM) intake, beyond which the digestibility of DM and fiber are reduced (NRC, 2001). Besides, unprotected fat has a depressing effect on rumen cellulolytic microbial activity (Ranjan et. al., 2010). Effect of acute negative energy balance on lactation (Tyagi et. al.,

2010). The present work was undertaken to study the effect of mineral supplementing on milk yield and its composition in Murrah buffaloes.

MATERIALS AND METHODS

The trial was conducted at Dairy farm, Department of Animal Husbandry, and Dairying. C.S. Azad University of Agriculture and Technology, Kanpur. To study the effect of the mineral supplement on milk production and its composition in Murrah buffaloes. Twelve healthy buffaloes were divided randomly into three groups based on their milk production. All the animals were dewormed and disinfested for ectoparasites before the start of the experiment adopting the standard protocol.

Method of feeding:

Group T0 (control) was fed with a basal diet (berseem, wheat straw, and conventional concentrate mixture) without any supplement and treatment groups T1 and T2 were fed with the basal diet with mineral supplement @50g/day/animal and @75g/day/animal, respectively. the Mineral supplement was added and mixed in concentrate mixture uniformly in the morning and fed individually to each animal of the treatment group. The roughage: concentrate ratio of the diet was 60:40. Selected of twelve Murrah buffaloes Table 1 and Chemical composition of the feed ingredients are presented in Table 2. Information about milk production and milk composition was collected for an individual animal at a weekly interval. The experiment was carried out for 4 weeks with Murrah buffaloes.

Sample Collection and Analysis:

Feed samples were collected from each

group at a weekly interval. The feed samples were analyzed for proximate principles as per A.O.A.C. (2005). Animals were hand milked twice daily (6.00 h and 18.30 h) and the yields were recorded. The milk samples were drawn at two consecutive days at weekly intervals from individual animals during both times of milking. After thoroughly mixing the samples of both times milking, a sample of 100 ml was taken using a dipper and transferred to a sample bottle with rounded corners (to avoid lodging of the milk solids) up to 3/4 the level, and then the bottle was corked tightly by a rubber stopper. The sample bottles were labeled properly. Milk samples were analyzed for milk composition in a Lacto scan milk analyzer.

Statistical Analysis:

The data were analyzed statistically using standard methods (Snedecor and Cochran, 1994). The data were expressed as Mean ± SE and were analyzed by one-way ANOVA using the general linear model of SPSS version 16 and Duncan's multiple range tests were applied to test the significance. Significance was declared when the P-value was less than 0.05.

Table - 1 : Selected of twelve Murrah buffaloes given below:

Treat-ment	Ear number	Lactation	Date of Calving	Milk /Yield /Day	Initial body Weight(kg)
T ₀	2	2	17-06-2017	6.20	469
	22	4	02-08-2017	6.45	461
	122	3	07-08-2017	5.20	436
	31	4	12-08-2017	6.10	455
T ₁	19	2	21-10-2017	5.60	438
	16	2	27-10-2017	6.30	471
	18	2	30-11-2017	5.90	460
	17	3	17-12-2017	6.15	452
T ₂	3	3	13-01-2018	5.80	438
	26	2	16-02-2018	6.95	478
	39	3	17-02-2018	5.08	446
	7	2	11-03-2018	6.12	459

Table - 2 : Composition of mineral supplement(Agrimin) one kg bag contains.

S.N.	Particulars	Amount
1.	Vitamin -A	700000 I.U.
2.	Vitamin –D3	70000 I.U.
3.	Vitamin –D2	0.8gm
4.	Vitamin -E	250gm
5.	Potassium	100gm
6.	Sodium	5.9gm
7.	Manganese	1500gm
8.	Sulphur	0.72%
9.	DL-Methionine	1000mg
10.	Calcium	25.5%
11.	Magnesium	6000mg
12.	Iodine	325mg
13.	Iron	1500mg
14.	Zink	9600mg
15.	Copper	1200mg
16.	Cobalt	150mg
17.	Phosphorous	12.75%

Table - 3 : Amount of different feed ingredients and feed supplement groups of Murrah buffaloes are given below.

S.NO.	Feed Offered	D.M. %	CP %	EE %	CF %	NEE %	Total Ash%
1.	Wheat Straw	90.00	3.00	1.00	38.00	46.00	12.00
2.	Green Berseem	20.00	17.50	2.25	24.00	46.00	10.25
3.	Concentrate Mixture	90.00	20.00	1.80	15.80	51.10	11.50
5.	Wheat bran	90.80	11.50	2.90	12.70	60.50	10.40
6.	Barley	89.50	9.50	1.50	5.50	78.00	5.50
7.	Mustard cake	90.00	36.00	11.00	10.00	33.00	10.00

RESULTS AND DISCUSSION

Milk production:- Overall mean values (%) of daily milk production pooled over periods were 24±715, 25±310, and 25±817 in treatment groups T₀, T₁, and T₂, respectively. Statistical analysis of data revealed that the difference between milk production. There was (P<0.05) significantly increased in the T₂ group as indicating that milk production was affected by Mineral supplementation of Murrah buffaloes. This finding is in agreement with Garg et. al. (2003) and Yadav et .al. (2012).

Milk fat: - Overall fat content of milk samples taken

from Murrah buffaloes, due to mineral supplement and the week was recorded. The milk fat percent in 7 ± 045 , 7 ± 090 , and 7 ± 950 percent in To, T1 and T2 Group respectively, group T2 was highly significant as compared to other groups. There was significant

($P<0.05$) improvement in milk fat percent due to feeding of Mineral supplement. The result of this study corroborated with the results by Nauta et. al. (2006).

Table - 4 : Effect of feeding of mineral supplement on milk yield and compositions’.

S.N.	Observation	Experiment groups		
		T ₀	T ₁	T ₂
1.	Milk yield (Later.)	24 \pm 715	25 \pm 310	25 \pm 817
2.	Milk fat (%)	7 \pm 045	7 \pm 090	7 \pm 950
3.	Milk protein (%)	4 \pm 036	4 \pm 052	4 \pm 085
4.	SNF (%)	9 \pm 480	9 \pm 503	9 \pm 515
5.	Total solid (%)	16 \pm 840	16 \pm 855	16 \pm 903
6.	Milk lactose (%)	5 \pm 045	5 \pm 070	5 \pm 092
7.	Water content of milk	83 \pm 137	83 \pm 037	82 \pm 958
8.	Total milk Ash content of milk	0 \pm 738,	0 \pm 750	0 \pm 770

Milk protein:- Overall milk protein content of milk due to mineral supplement and per week recorded. The average milk protein content in the week was 4 ± 036 , 4 ± 052 , and 4 ± 085 percent in To, T1, and T2 Group respectively; group T2 was highly significant as compared to other groups. Statistical analysis of data revealed that the difference among milk protein was non-significant indicating that milk protein was unaffected by mineral supplementation of rumen-protected fat to lactating Murrah buffaloes. This finding is in agreement with Naik et al. (2009), Tyagi et al. (2009), Thakur and Shelke (2010), Sirohi et al. (2010).

Solid, not fat (SNF):- Overall SNF content of milk samples, due to mineral supplements and per week recorded. The SNF content average in the week was 9 ± 480 , 9 ± 503 , and 9 ± 515 percent in To, T1, and T2 Group respectively. Group T2 was non-significant as compared to other groups. In the present investigation, there was found to be a nonsignificant effect of SNF content on the amount of affected by Mineral supplementation during a different week. The results obtained in the investigation were closed to the research workers Pillai et. al. (2004), Naik et al. (2009), Thacker and Shelke (2010), Sirohi et. al. (2010).

Total Solid:- Overall total solid content of milk samples, due to mineral supplement and per week

recorded. The average content total solid in the week were 16 ± 840 , 16 ± 855 , and 16 ± 903 percent in To, T1, and T2 Group respectively, group T2 was highly significant as compared to other groups. In the present investigation, there was found to be a significant effect of total solid content on the amount of affected by Mineral supplementation during a different week. The overall total solid content of Murrah buffalo's milk was recorded to be 17 ± 0.20 percent which was close to the result obtained and reported by Wanapat et. al. (1999) and), Sirohi et. al. (2010).

Milk Lactose: - Overall milk lactose content of milk due to mineral supplement and was per week recorded. The average lactose contains due to mineral supplement was recorded to be was 5 ± 045 , 5 ± 070 and 5 ± 092 percent in TO, T1 and T2 Group respectively, group T2 was highly significant as compared to other groups. There was ($P<0.05$) significantly increased in the T2 group as indicating that milk lactose was affected by Mineral supplementation of Murrah buffaloes. The overall lactose content of Murrah buffalo's milk lactose was recorded to 5 ± 140 percent. Which was close to the result obtained and recorded by Kalita et. al. (2009).

Total Milk Ash: - Overall total milk Ash content of milk samples, due to mineral supplement and per week recorded. The ash average content in the week

was 0±738, 0±750, and 0±770 percent in To, TI, and T2 Group respectively; group T2 was highly significant as compared to other groups. In the present investigation, there was found to be a significant effect of total Milk Ash content on the amount of affected by Mineral supplementation during a different week. The overall total Milk Ash content of Murrah buffalo's milk was recorded to be 0.800 percent which was close to the result obtained and reported by Wanapat et. al. (1999) and Sirohi et.al. (2010).

The Water content of milk: - Overall Water content of milk of content of milk samples, due to mineral supplement and per week recorded. Water content average per week was 83±137, 83±037, and 82±958 percent in To, TI, and T2 Groups respectively group

T2 was highly significant as compared to other groups. In the present investigation, there was found to be a significant effect of Water content milk of content on the amount affected by Mineral supplementation during a different week. The result obtained and investigated by Singh and Singh (2003), Naik et. al. (2009), Tyagi et. al. (2009), Thakur and Shelke (2010), Sirohi et. al. (2010).

Determination of economical Murrah buffalo mineral supplement:-

Mineral supplement given to the Murrah buffalo Agrimin at the rate of 50 gm was given to the T1 group and mineral supplement Agrimin at the rate of 75 gm given to the T2 group of Murrah buffaloes. The calculation regarding the cost & profit of mineral supplements is given in the table.

Table - 5 : Cost and benefit of mineral supplement of different doses

S.N.	Mineral Supplement Dose (gm/day)	Cost of minerals (Rs./day)	Amount additional of milk (ml/day)	Cost additional of milk (Rs./day)	Net profit (percentage)
1	Agrimin (50gm)	3.13	163	6.52	108.30
2	Agrimin (75gm)	4.67	260	10.40	122.69

From the table, it is clear that based on net profit percentage the mineral supplement Agrimin 75 gm was economically cheaper than mineral supplement Agrimin 50gm. The result was very close to Meet et al (2015).

CONCLUSION

Based on the above finding it can be concluded that mineral groups (TI andT2) shown better milk production performance. They were not affecting milk production. It is, therefore, recommended that the supplementation of this mineral supplement is beneficial in Murrah buffaloes, has shown the best performance over mineral supplementation 75 gm Agrimin.

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EFFECT OF NAA AND BORON LEVELS ON GROWTH OF CAULIFLOWER (BRASSICA OLERACEA L. VAR. BOTRYTIS) CV. KASHI GOBHI - 25

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ABSTRACT

Data regarding the effect of NAA and Boron on the plant height of Cauliflower at 30, 60 DAT and at harvest has been presented in Table 1. The maximum plant height (21.98, 45.01 and 59.67cm) was recorded with NAA @ 300 ppm (N3) at 30, 60 DAT and at harvest respectively which was found significantly higher over rest treatments. The data further, reveals that the maximum plant height was recorded with the treatment B3 i.e. 2.25 kg/ha Boron. While minimum recorded under control (14.83, 31.00 and 42.62 cm) at 30, 60 DAT and at harvest respectively. The data presented in Table 2 explicit that number of leaves per plant 30, 60 DAT and at harvest was significantly influenced by different NAA and boron levels. The maximum number of leaves at harvest were recorded in treatment N3 (NAA @ 300 ppm), Further the number of leaves at 30, 60 DAT and at harvest stage were also significantly affected by different boron levels. The maximum number of leaves at 30 DAT (9.06), at 60 DAT (17.77) and at harvest (24.16) were found in B3 i.e., Boron 2.25 kg/ha, which was significantly superior over control.

Keywords : *Cauliflower, growth, boron, nutrition.*

INTRODUCTION

The optimum use of manures and fertilizers is one of the essentials for increasing the yield of vegetable crops. The organic matter forms a very important source of plant nutrients and also affects certain properties of soil. It increases the water

holding capacity of the soil and improves its structure. The addition of organic matter through the debris of the vegetable crops is very little and quite insufficient to cause of any beneficial effect. At one time in past only organic manures were used for vegetable growing but now fertilizers are being used

increasingly because of the quick availability of nutrients to the plants. There is a wrong notion in the minds of certain people that abundant use of chemical fertilizers in vegetable production affects the quality of vegetable adversely and such vegetables do not posses good taste. In fact, for high productivity and good quality of vegetables, use of chemical fertilizers is essential. In the manuring schedule of vegetable crops, primary micro-nutrients play the most important role in their need for proper growth and yield is much greater than others (Singh *et al* 2016).

The relationship of one element to another is very important. A high quantity of P in the soil or in the plant system may result is deficiency of Zn. A high amount of available K may result in a deficiency of Mg. Therefore, proper balance among the elements is essential for its efficient uptake and utilization in plant body. When more N is added, the need for move K is created because the yield is greater and the plant's needs increase. A farmer might not see K deficiency in one field where only a small amount of N was added, but on an adjoining area where more N was applied, K deficiency may occur.

MATERIALS AND METHODS

A field experiment entitled “Effect of NAA and Boron Levels on Growth of Cauliflower (*Brassica oleracea* Var. *botrytis* L)”was conducted at Horticulture farm, Kulbhaskar Ashram Post Graduate College, Prayagraj during *rabi* season, 2020-21. The experiment was laid out in randomized block design (RBD) with 3replications. Number of Treatments were 16 .

- (A) NAA levels Notations 1. Control (N0) 2. 100 ppm (N1) 3. 200 ppm(N2) 4. 300 ppm(N3)
- (B) Boron levels1. Control : (B0) 2. 0.75 kg/ha : (B1) 3. 1.50 kg/ha : (B2) 4. 2.25 kg/ha : (B3)

Details of the treatments along with combinations.

Treatment	Combination	Treatment	Combination
T ₁	N ₀ B ₀	T ₉	N ₂ B ₀
T ₂	N ₀ B ₁	T ₁₀	N ₂ B ₁
T ₃	N ₀ B ₂	T ₁₁	N ₂ B ₂
T ₄	N ₀ B ₃	T ₁₂	N ₂ B ₃
T ₅	N ₁ B ₀	T ₁₃	N ₃ B ₀
T ₆	N ₁ B ₁	T ₁₄	N ₃ B ₁
T ₇	N ₁ B ₂	T ₁₅	N ₃ B ₂
T ₈	N ₁ B ₃	T ₁₆	N ₃ B ₃

RESULTS AND DISCUSSION

1. Plant height

Effect of NAA levels: Data regarding the effect of NAA and Boron on the plant height of Cauliflower at 30, 60 DAT and at harvest has been presented in Table 1 The maximum plant height (21.98, 45.01 and 59.67cm) were recorded with NAA @ 300 ppm (N3) at 30, 60 DAT and at harvest respectively which was found significantly higher over rest treatments but it was statistically at par with N2. The increase in plant height 56.66, 49.48 and 38.64 per cent higher at 30, 60 DAT and at harvest respectively over control.Whereas, minimum (14.03, 30.11 and 43.04 cm) were recorded in control at 30, 60 DAT and at harvest stage respectively. Similar results were also observed by Yadav *et al* 2018 ,and Swati *et al* 2014 .

Effect of Boron levels: The data further, reveals that the maximum respectively were recorded with the treatment B3 *i.e.* 2.25 kg/ha Boron. While minimum recorded under control (14.83, 31.00 and 42.62 cm) at 30, 60 DAT and at harvest respectively. The treatment B3 was found significantly superior over control, 0.75 and 1.50 kg boron. The increase in plant height under B3 was recorded by 46.80 and 25.55 percent at 30 DAT, 46.77 and 25.55 per cent at 60 DAT and 46.76 and 25.53 per cent more at as

compared to control and B1, respectively. Findings are in conformity with the findings of Sharma *et al* 2010 and Negi *et al* 2017 .

Table - 1 : Effect of NAA and boron levels on plant height of Cauliflower

Treatment	Plant height (cm)		
	30 DAT	60 DAT	At harvest
NAA Levels			
N0 - Control	14.03	30.11	43.04
N1 - 100ppm	17.67	36.45	51.33
N2 - 200ppm	20.11	42.66	58.01
N3 - 300ppm	21.98	45.01	59.67
SE _m +	0.52	1.10	1.51
CD (P = 0.05)	1.51	3.18	4.35
Boron Levels			
B0 - Control	14.83	31.00	42.62
B1- 0.75 kg/ha	17.34	36.24	49.83
B2- 1.5 kg/ha	19.85	41.49	57.04
B3- 2.25 kg/ha	21.77	45.50	62.55
SE _m +	0.52	1.10	1.51
CD (P = 0.05)	1.51	3.18	4.35

2. Number of leaves per plant

Effect of NAA levels: The data presented in Table 2 explicit that number of leaves per plant 30, 60 DAT and at harvest was significantly influenced by different NAA and boron levels. The maximum number of leaves at harvest were recorded in treatment N3 (NAA @ 300 ppm), which was found to be significantly higher over other treatments but statistically at par with N2 treatment. The mean increase in number of leaves under N3 was 73.92, 70.57and 37.19 per cent more as compared to control at 30, 60 DAT and at harvest stage, respectively. Similar results were also observed by Kumar et al 2015.

Effect of Boron levels: Further the number of leaves at 30, 60 DAT and at harvest stage were also

significantly affected by different boron levels. The maximum number of leaves at 30 DAT (9.06), at 60 DAT (17.77) and at harvest (24.16) were found in B3 i.e., Boron 2.25 kg/ha, which was significantly superior over control and B1 but statistically at par with B2. The maximum number of leaves increased under treatment B3 which was found to be 73.92, 46.74 and 46.78 per cent more as compared to B0 treatment at 30, 60 DAT and at harvest stage respectively. . Findings are in conformity with the findings of Sharma *et al* 2010 and Negi *et al* 2017 .

Table - 2 : Effect of NAA and boron levels on number of leaves of Cauliflower

Treatment	Number of leaves		
	30 DAT	60 DAT	At harvest
NAA Levels			
N0 - Control	5.33	10.33	16.67
N1 - 100ppm	7.01	15.08	20.24
N2 - 200ppm	9.11	17.22	22.11
N3 - 300ppm	9.27	17.62	22.87
SE _m +	0.23	0.44	0.58
CD (P = 0.05)	0.66	1.28	1.67
Boron Levels			
B0 - Control	6.17	12.11	16.46
B1- 0.75 kg/ha	7.22	14.16	19.24
B2- 1.5 kg/ha	8.26	16.21	22.03
B3- 2.25 kg/ha	9.06	17.77	24.16
SE _m +	0.23	0.44	0.58
CD (P = 0.05)	0.66	1.28	1.67

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IDENTIFICATION OF CONSTRAINTS IN PRODUCTION AND MARKETING OF MARIGOLD

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ABSTRACT

India has a long tradition of flower cultivation from vedic era to modern era. Now a days flower cultivation (floriculture) assuming the form of business and became fast emerging, highly competitive venture on the world scenario. In flower cultivation marigold is one of the most popular and colourful ornamental flower crop. Cultivation of marigold gradually becoming commercialised due to its highly usage in social and religious function but still there is a wide gap between production capacity and productivity potential. The present study entitled “identification of constraints in production and marketing of marigold” was carried out in KashiVidhyapeeth block of Varanasi district, U.P. The fifty (50) farmers who were involved in marigold cultivation selected randomly from five villages of the block. The primary data were collected through pre-tested structured interview schedule and simple tabular analysis were employed to identify the constraints. The response of farmers about marigold production and marketing constraints were namely High cost of planting materials, irrigation problem, and timely unavailability of planting material, low selling price and costly transportation.

Keywords: *Marigold cultivation, marketing infrastructure, floriculture, constraints in production and marketing.*

INTRODUCTION

India is predominantly an agricultural country, in present time the horticultural production took over the status of food grain production. In horticultural production floriculture is one of the emerging, fast growing field. India has a long tradition of flower cultivation (floriculture). Marigold is one of the very popular and most important flower crops which belongs to

family Asteraceae. Generally the marigold has grown for the flower production as well as for loose flowers and used in different forms for different purpose. In India the marigold flower is used mainly in socio-religious functions on the one hand, and the other one side it is used in pharmaceuticals, food supplements, insect fly repellents, colouring agents for cosmetics and poultry industry etc. therefore, it has an immense

regular demand of cut flowers for global markets. Marigold is broadly classified into two groups, viz., African marigold (*Tagetes erecta* L.) and French marigold (*Tagetes patula* L.) African marigold (*Tagetes erecta* L.) is a seasonal flowering plant which belonging to the family Asteraceae and is a native of South and Central Americas, especially Mexico. It can be used in landscaping and can also be used as bedding or potted plant. The petals of the flowers serve as a major source of Carotenoids and leaves are effective in controlling root-knot nematodes (Malik et al 2021). The world-leading marigold producing countries are USA, Europe, China, India, Pakistan and Bangladesh. In gardens marigold provides beautification of beds and borders. An orange pigment extracted from petals is in great demand for poultry feed. Marigold is also grown for keeping the nematode population in soil under control (Verma et al 2013). In eastern U.P. Varanasi, Allahabad, Sultanpur and Ghazipur districts are flowers cultivation districts in which Varanasi is very famous ancient and religious city, so having all over year demand of flowers and flower products (Singh et al 2013). Cultivation of marigold gradually becoming commercialised due to its highly usage in social and religious function but still there is a wide gap between production capacity and productivity potential therefore the present study was carried out with the objective to ascertain the constraints faced by the marigold growers in production and marketing of marigold.

MATERIALS AND METHODS

Varanasi district (city of temple) of Uttar Pradesh was selected purposively due to their religious and spiritual importance. Varanasi district consists of 9 developments block out of that one block i.e., kashi Vidyapeeth have been selected for the study. Thus present study is based on 50 farmers from 8 villages of kashi Vidyapeeth block of Varanasi district. Data collected for study pertaining

to the period 2020-2021. Primary data was collected from selected Marigold growers through personal interview method with the help of pretested schedules for getting the information on Constraints in the Production and Marketing of Marigold. The collected data were compiled, tabulated and analyzed to accomplish the objectives of the study.

RESULTS AND DISCUSSION

The marigold growers were asked to give the information about the constraints countered by them. A cumulative list of problems/constraints prepared at the time of data collection and among them six major problems related to marigold production and marketing were shortlisted according to respondent's responses. For each of these constraints, total number of marigold growers in percentage was worked out and rank order was given from the highest percentage to the lowest percentage. Tabular analysis and rank assignment was done on the basis of response of different size of farms i.e. marginal, small and medium.

Major challenges and constraints faced by marigold growers of study area were basically divided in two part i.e.

- [1] Problems related to production of marigold
- [2] Problems related to marketing practices of marigold

The marigold growers faced by various types of Production constraints in the study area. It is presented in Table 1.1 the data in table 1.1 revealed that high cost of planting material/ seeds were felt to be the first major constraints by approximate fifty three percent of marginal, twenty six per cent of small and twenty one per cent of medium farm size respondents. The second most important problem in the study area was irrigation related problems, this was mainly due to uneven rainfall distribution. As regards the production constraints timely unavailability of planting materials found the third most problem of study area followed by Timely

Unavailability of Inputs(seed, fertilizer, skilled labour), Lack of Cooperative Institutions for production and marketing of marigoldand Non

availability of credits at proper timewere the major problems with the rank fourth, fifth and sixth respectively.(Table 1.1)

Table - 1.1 : Constraints faced by the respondents for production of marigold on different size of sample farms: (n=50)

Sl. no.	Particulars	Size of sample farms			Total	Ranks
		Marginal	Small	Medium		
1	Timely Unavailability of Planting materials	16 (59.25)	07 (25.92)	04 (14.82)	27 (100)	III
2	Irrigation Problems	19 (55.88)	08 (23.52)	07 (20.58)	34 (100)	II
3	High cost of Planting materials/ seeds	20 (52.63)	10 (26.32)	08 (21.05)	38 (100)	I
4	Lack of Cooperative Institutions for production and marketing of marigold	11 (61.11)	04 (22.22)	03 (16.67)	18 (100)	V
5	Non availability of credits at proper time	10 (71.42)	03 (21.42)	01 (7.14)	14 (100)	VI
6	Timely Unavailability of Inputs	14 (60.86)	06 (26.08)	03 (13.04)	23 (100)	IV

Among marketing constraints the marigold growers endorsed major constraints presented in table 1.2. The constraints faced by the respondents for marketing practices of marigold on different size of sample farms were:Low selling price was the serious challenges in study areas. Which is supported by marginal (52.50 %), small (27.50) and

medium (20%) farmers.The second most important problem faced by the respondents in study area was costly transportation followed by lack of scientific storage facilities, lack of technical knowledge of flower packing, vehicle problem for transportation and lack of skilled labour for growing flowers respectively.

Table - 1.2 : Constraints faced by the respondents in marketing of marigold on different size of sample farms: (n=50)

SL. no.	Particulars	Size of sample farms			Total	Ranks
		Marginal	Small	Medium		
1	Lack of technical knowledge of flower packing	15 (55.55)	08(29.62)	04 (14.82)	27 (100)	IV
2	Costly transportation	19 (51.35)	12 (32.43)	06 (16.22)	37 (100)	II
3	Low selling price	21 (52.50)	11 (27.50)	08 (20.00)	40 (100)	I
4	Vehicle problems for transportation	13 (54.16)	08 (33.33)	03 (12.50)	24 (100)	V
5	Lack of Scientific storage facilities	17 (54.83)	09 (29.03)	05(16.13)	31 (100)	III
6	Lack of skilled labour for growing flowers	10 (58.82)	05(29.41)	02 (11.76)	17 (100)	VI

CONCLUSION

It can be concluded that High cost of planting materials/seeds were the serious constraints of marigold production which were supported by most of the respondents. Low selling

price was the most important marketing constraints. It was also observed at the time of data collection that totally lack of marketing news and intelligence augmented the constraints seriousness. Therefore it is suggested that government should make the

arrangement for smooth communication of market news and intelligence which facilitate the marigold growers. Some other suggestions based on respondent views and researcher observation are given below,

Suggestion: major suggestion received from the respondent side and researcher observation to overcome the mentioned problem are:

- The major inputs particularly seeds/planting materials, Fertilizers, insecticides and irrigation etc. Should be made available to the farmers just before the growing period which will be helpful in reducing the cost of cultivation and will increase the production of marigold.
- Price fluctuation/ low selling price after harvesting is the major problem of study area so government should take necessary action through different organization to control the price system and government should ensure that price of the marigold will remain uniform all-round the year.
- Government or local agencies/KVK should provide the training to marigold growers /to create the awareness among the marigold growers regarding technical use of production and marketing practices.
- To control the labour and other cost, modern technology should be undertaken. Extension worker/village worker should provide the training to marigold growers for diffusion and adoption of modern technology.
- The development of market infrastructure like road, electricity supply, irrigation facility, communication and transport should be increased to get better and remunerative price at market.
- Government should control the price of

agricultural inputs at time of growing.

- The credit facilities should be available at right time and in adequate amount to adopt the modern technologies.
- Government should organize the agriculture camp through different institution and organization (SAUs, KVK, and Agriculture office) to percolate the information about price and marketing trends of marigold market.
- Short educational/awareness visits of marigold growers should be arranged to various agricultural/ horticultural universities, research stations, krishivigyan Kendra (KVK) and fields of progressive farmers which would be helpful in technical knowledge of marigold production and to solve the other constraints.
- Flowers crops should be introduced as an inter-crop/mixed-crop/rotational crop in the cropping system. Some financial incentives should be given to the farmers for bringing more area under flowers crops.

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ASSESSMENT OF GROUND WATER QUALITY OF LACHCHIWALA DEHRADUN UTTARAKHAND

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ABSTRACT

Dehradun (Lachchiwala) is situated on the east coast of India and receive water supply from the ground water sources demarked as water fields. The quality of ground water resources is increasingly decline, significantly affecting people's life and health. Groundwater pollution is a worldwide problem with significant effects on human health and environmental security. It requires an in-depth understanding as the access to safe drinking water is a fundamental human right. The aim of study to assess public perception on existing ground water quality and scheme over conventionally used free ground water. Groundwater sample were collected from the water fields. In this paper comparative analysis among the sites regarding some parameters of water samples has been done.

Keywords : *Groundwater, turbidity, pathogens, coliform, toxic.*

INTRODUCTION

Water is one of the most important substances on earth. All animal and plants need water to survive. Among all available sources of water, groundwater is most decentralized and dependable source of water for millions rural and urban families. It accounts for nearly 80% of the rural domestic water needs and 50% of the urban water needs in India. (Dinesh et al. 2006).

Humans use water for several purposes, drinking and washing being the primary one. Safe and clean drinking water is essential for life. Water is becoming a crucial problem for developing

countries. Therefore, water that is to be use for human consumption should be free from pathogens, harmful chemicals or any other such contaminations (Reda et al. 2016). Otherwise, it may lead to diseases and epidemics.

India is one of the largest users of groundwater particularly for drinking and agriculture purpose. (Shah.2009). Ground water gets contaminated with a variety of pollutants such as domestic agriculture and industrial waste due to utilisation of fertilizers pesticides and other chemical products (Nag et al. 2012). There are number of reports on the groundwater quality from

Bangladesh (Baher etal 2012), Tamil Nadu (Ramamoorthy etal. 2018) Madhya Pradesh (Mishra etal. 2013). Karunanidhi etal. (2020) also discussed about drinking water quality and possible health risks in the Shanmuganadhi River Basin of south India. The water quality index (WQI) revealed that 52% of samples are in poor, very poor and not suitable categories, causing more health risk for children. In a study of south western Punjab (India), Kumar etal. (2020) described the source, distribution and potential health risk assessment.

Need of study: The two villages of Lachchiwala Gram Panchayat of Doiwala block of Dehradun district of Uttarakhand was selected for groundwater quality assessment. There had been no recent analysis of groundwater quality in the reason. Thus the study would be helpful in analysing the present-day quality of the groundwater in that area.

OBJECTIVE:

1. The main objective of the study is to assess the :-

a) Quality of groundwater at two selected villages Missarawala and Missarwala Kalan of Lachchiwala Gram Panchayat, Dehradun.

b) Variation and 12 physicochemical and biological water quality parameters.
2. Evaluation of analysed water quality with respect to Bureau of Indian standards (BIS):10 500 (2012).

MATERIALS AND METHODS

Study area: The selected study area lies in the Dehradun district in Uttarakhand state in India. The area taken for analysis of drinking water quality was the region of Lachchiwala Gram Panchayat Doiwala block, Dehradun. The details of which are presented in table 1.

Table - 1: Details of the sampling sites of Lachchiwala Gram Panchayat

Name of selected village	Nature of Source	Latitude	Longitude	Elevation above mean sea level (meters)
Missrawala	Nalkoop	30 ⁰ 11'1.81651"N	78 ⁰ 7'29.52055"E	488
Missrawala Kalan	Nalkoop	30 ⁰ 11'6.32969"N	78 ⁰ 7'18.8386"E	491

Missarawala Kalan is a medium-sized village, with total 181 families residing. It has a population of 1081. Missarawala is a village with about 516 houses and a population of 3188 (census 2011).

Collection of water sample: High density polyethylene Tarson bottles were used to collect the samples and each of them marked with that name of site. The collected samples were protected from direct sunlight during transportation, refrigerated at 4 degree and analysed within 2 to 3 days.

Methodology: Each sample were analysed for 12 physicochemical parameters such as pH, turbidity, total dissolved solids (TDS), electrical conductivity

(EC), total alkalinity, total hardness (TH), chloride, nitrate , sulphate, fluoride, total coliform and faecal coliform. pH, turbidity, EC and TDS were measured by pH metre, turbidity metre and conductivity metre respectively.

Total alkalinity was determined by sulphuric acid titration method with the help of Bromcresol green methyl red indicator. Chloride ion concentration was measured by argento metric method, Nitrate by cadmium reduction method, Sulphate by turbidity metric method. Fluoride by UV VIS Spectrophotometer method. Total coliform and faecal coliform detected by membrane filtration method. The statistical analysis has been done using

MS excel.

biological parameters of studied water sample during Feb and March 2021 are presented as table2.

RESULTS AND DISCUSSION

The observed value of physicochemical and

Table - 2: Results of groundwater samples of two villages of Lachchiwala, Dehradun studied during February and March, 2021

S No.	Parameter	BIS: 10500 (2012) Specifications		February 2021		March 2021	
		Desirable Limits	Permissible Limits	Missarawala Site 1 (S1)	Missarawala Kalan Site 2 (S2)	Missarawala Site 1 (S3)	Missarawala Kalan Site 2 (S4)
1.	pH	6.5	8.5	7.8	7.92	7.58	7.6
2.	Total Hardness (mg/L)	200	600	301	321	325	260
3.	Total Alkalinity (mg/L)	200	600	176.5	178.5	171	180
4.	Total Dissolved Solids (mg/L)	500	2000	375	373	379	367
5.	Turbidity (NTU)	1	5	0.46	2.90	0.13	0.5
6.	Sulphate (mg/L)	200	400	92	91	83	85
7.	Nitrate (mg/L)	45	No Relaxation	0.7	2.65	0.4	0.1
8.	Fluoride (mg/L)	1	1.5	0.3	0.18	0.85	0.87
9.	Electrical Conductivity (us/cm)	-	-	589	585	592	574
10.	Chloride (mg/L)	250	1000	4.8	4.7	6.4	4.5
11.	Total Coliform	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	Above/100 ml	Above/100 ml	Above/100 ml	Above/100 ml
12.	Faecal Coliform	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	Above/100 ml	Above/100 ml	Above/100 ml	Above/100 ml

We carried single factor analysis on parameters 1 to 10 and tested following hypothesis (H₀):-

Groups	Count	Sum	Average	Variance		
Missarawala Site 1 (S1) Feb	10	1547.56	154.756	42039.3		
Missarawala Kalan Site 2 (S2) Feb	10	1566.85	156.685	42126.29		
Missarawala Site 1 (S3) March	10	1565.36	156.536	43436.01		
Missarawala Kalan Site 2 (S4) March	10	1479.57	147.957	39172.92		

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	507.2882	3	169.0961	0.004056	0.999637	2.866266
Within Groups	1500971	36	41693.63			
Total	1501478	39				

(H₀: There is no significant difference in the means with respect to sites)

*Comparing with P value our null hypothesis is accepted at 5% level of significance.

The observed values are within the maximum permissible limits prescribed by Bureau of Indian standard (B I S 2012) are described and discussed below:

pH: The pH value of studied sample were in range of 7.6to 7.8. It indicates that the groundwater will have no ill effects on the consumer.

Turbidity: It is also found within the (BIS) permissible limits that are between 0.13 NTU to 2.90 NTU. Highest value of turbidity was observed at site S-2 in March 20 21. A decrease in turbidity was observed at each site from March to April. Hence it is fit for domestic purposes. High turbidity in drinking water increases the risk to human health particularly to infants, the elderly and the people with compromised immune system.

Alkalinity: The range was between 170-180 mg per litre it is the safe range. Highest it was recorded at S-2 in March 2021. The water from these sources is fit for drinking and a domestic use .The alkalinity in most of water supplies is due to dissolved bicarbonate salts.

Chloride: Its concentration in the tested sample was found much below the limit prescribed in the BIS (2012) i.e. between 4.5 - 6.4 mg per litre. Normal chloride level in drinking water has no detrimental effects on the health. Swarnlathaet.al. (1998) reported that high chloride concentration is associated with increased level of pollution.

Nitrate: The range lies between 0.10 - 2.65 mg per litre .Therefore, it poses no threat to the health of the people and can be used for drinking. It primarily originates from fertilizers manure storage operations and septic tanks. High nitrate level is toxic in drinking water. The water test for nitrate is highly recommended for household with infants, nursing mother, pregnant women or elderly people. It can cause methemoglobinemia in infants. Therefore if the water supply has never been tested for nitrate, it should be tested.

Sulphate: High sulphate level may be associated with bitter taste and can have laxative effect on humans. Its concentration was found between 85 - 90 gram per litre.

Total hardness: It is recorded between 260 - 325 mg per litre. Some studies suggest a correlation between hard water and cardiovascular disease mortality, however other study do not suggest such correlation.

Total dissolved solids: It can give a bitter taste and unpleasant odour in water. It interferes with the taste of food and beverages, and makes them less desirable to consume and cause variety of health problem.

In the present analysis the TDS are within the range of 367 - 379 mg per litre.

Fluoride: It is the important toxicological environmental hazard, when interested quantities less than 0.5 mg per litre. It is beneficial for dental health but if taken in concentration greater than 1.5 mg per litre, it may cause fluorosis. The fluoride concentration in the studied water sample is less than 1 mg per litre; therefore it poses no threat to human health and is a contributor to the dental health.

Total coliform and faecal coliform: In the present study no growth of any organism was observed after 24 hours of incubation and hence water was found free from bacterial contamination. Bacterial growth when found is usually due to pollution of water through septic systems and industrial wastes. The groundwater of selected area is suitable for drinking and other domestic purposes with respect to biological parameters.

CONCLUSION

The above comparative analysis about the sites shows that there is no significant difference in the mean with respect to the sites.

The result shows that the overall quality of water in the two villages studied is good. Most of parameter falls within the desirable limit of

Drinking water specification, Bureau of Indian Standard BIS (2012). Hence the domestic and irrigation need of both places can be met with these ground water supplies. The study also revealed that the quality of groundwater in February was better than in March. The concentration of nitrate and sulphate was lesser in month of March. The bacterial contamination was absent in both sites water samples.

Further studies and groundwater quality assessment should be done time to time to regulate and check the groundwater quality of the nearby villages. Such studies will enable Government and regulatory bodies to take measure to maintain water quality as well as is enabled them to take step to ensure the health and hygiene of the local population.

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EFFECT OF CUTTING AND INTRA ROW SPACING LEAF YIELD OF FENUGREEK (TRIGONELLA FOENUM-GRAECUM L.) CV. IC-74

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ABSTRACT

Data regarding the effect of cutting and intra row spacing leaf yield of Fenugreek Presented in Table 1 Regarding leaf yield per plot, the highest (2329.33g) was obtained with the combination C2 x S1 (two cuttings & 25 x 5.0cm), while, C1 x S4 (one cutting & 25 x 12.5 cm) gave the lowest (635.66g). The data presented in Table 2 explicit that effect of cutting and intra row spacing on leaf yield of Fenugreek in Kg/ha. In the meanwhile, interaction between C2 x S1 (two cuttings & 25 x 5.0cm) gave the highest leaf yield per hectare (6904.62kg) and the combination C1 x S4 (one cutting & 25 x 12.5cm) gave the lowest (1883.33 kg).

Keywords : Fenugreek, cutting, intra row spacing and yield

INTRODUCTION

The seed spices fenugreek (*Trigonella foenum-graecum* L.) belongs to family Fabaceae, 2n=16 (Fryer, 1930). It has been originated in Egypt. Its wild form for are found growing in north western India. Argentina, Egypt, Southern France, Morocco, Spain, Turkey, China, Pakistan and Lebanon are the leading counties for fenugreek production. India is the largest producer of fenugreek in the world. During 2011–12, production was 121,775 tonnes of seeds from an area of 96,304 hectares (237,970 acres). Its seed is

traded as a spice, and in an oil extract form as oleoresin. India consumes most of the seeds. Its export was 799 tonnes in 1960–61, and increased greatly to 15,135 tons by 1995–96 and then to 21,800 tonnes during 2011–12. It was exported to UAE, Sri Lanka, and Japan, and European countries of UK, Netherlands, Germany and France. Fenugreek is grown during Rabi or winter season as a leafy vegetable, seed or leaf spices for human consumption (Som and Maity 1986, Pandey 1993) fodder for the animal (Jatasra and Lodhi, 1980) and green manure to enrich the soil fertility through

nitrogen fixation i.e above 283kg N/ha (Gill & Singh 1988).

MATERIALS AND METHODS

The present investigation entiteled “Studies on the effect of cutting and intra row spacing o leaf and seed yield of fenugreek (*Trigonella foenum-graceum* L.)cv.IC-74. was carried out at the Vegetable Research Farm, Department of Vegetable Scince, Kulbhashkar Ashram P.G. College Prayagraj during *Rabi* 2020-2021 i.e. from October, 2020 to April , 2021. The experimentwas laid out in randomized block design (RBD) with three replication and four treatment, total number of treatments 12.

Details of cutting (C) and intra row spacing (S) treatments undertaken during the study.

C: Cutting	S: Spacing
	S ₁ : 25x5.0cm
C ₀ : No Cutting	S ₂ : 25x7.5cm
C ₁ : One Cutting (50 DAS)	S ₃ : 25x10.0cm
C ₂ : Two Cutting (50& 80DAS)	S ₄ : 25x12.5cm

RESULTS AND DISCUSSION

1. Effect of cutting and intra row spacing on leaf yield per plot (g).

The analysis of variance revealed significant differences for the effect of cutting and intra row spacing on leaf yield per plot (Table 1) 690.41g. Two cuttings (C₂) resulted in significantly more leaf yield per plot (1690.41g) than one cutting (C₁) which resulted in lesser leaf yield per plot (810.66 g). For the effect of intra row spacing on leaf yield per plot, range was 833.50- 1721.50 g. The closest spacing S₁ (25 x 5.0cm) gave the maximum leaf yield per plot (1721.50 g) and found highly significant for leaf yield plot, whereas, the widest

spacing S₄ (25 x12.5 cm) resulted in minimum leaf yield per plot (833.50g). The results had a significant effect on leaf yield and two cuttings produced significantly higher leaf yield than one cutting and Similar result were reported by Dahiya et al.(2009); Kumar and Singh (2007); Muhammad et al.(2005). Among the interaction between cutting and intra row spacing, leaf yield per plot ranged from 637.66-2330.33g. The interaction between C₂ x S₁ (two cuttings & 25 x 5.0 cm) gave significantly highest leaf yield per plot (2329.33 g). While, the combination C₁ x S₄ (one cutting & 25 x 12.5 cm) gave the lowest leaf yield per plot (635.66 g).

Table - 1 : Effect of cutting and intra row spacing on leaf yield per plot (g) in fenugreek

Spacing \ Cutting	S ₁	S ₂	S ₃	S ₄	Mean	Range
C ₀	-	-	-	-	-	-
C ₁	1110.66	810.66	685.66	635.66	810.66	635.66-1110.66
C ₂	2329.33	1967.33	1436.66	1928.33	1690.41	1028.33-2329.33
Mean	1721.50	1390.50	1062.66	833.50	1252.04	637.66-
Range	1110.66-2329.33	813.66-1970.33	688.66-1439.66	638.66-1031.33		2329.33
CD _{0.05}	CV	SE(+d)	C:Cutting		S: Spacing	
C: 169.81	C: 47.47	C: 77.33	C ₀ : No cutting		S ₁ : 25x5.0cm	
S: 239.98	S: 21.88	S: 109.20	C ₁ : one cutting (50 days)		S ₂ : 25x7.5cm	
CxS:343.62	CxS:49.15	CxS:158.67	C ₂ : Two cutting (50 and 80 days)		S ₃ : 25x10.0cm	
					S ₄ : 25x12.5cm	

2. Effect of cutting and intra row spacing on leaf yield per hectare (kg)

Observations pertaining to the effect of cutting and intra row spacing on leaf yield per hectare revealed significant differences which have been presented in the Table 2 For the effect of cutting on leaf yield per hectare, range was (2411.33-5013.42 kg). Two cuttings (C₂) resulted in significantly more leaf yield per hectare (5013.42

kg) than one cutting (C₁) which resulted in lesser leaf yield per hectare (2411.33 kg). For the effect of intra row spacing on leaf yield per hectare, range was 2474.99- 5103.47kg. Spacing S₁ (25 x 5.0 cm) gave significantly maximum leaf yield per hectare (5103.47 kg) S₄ spacing (25 x12.5 cm) which resulted in minimum leaf yield per (2474.99 kg). The higher yield of leaves was mainly contributed by the higher plant population per unit area in closer intra row spacing (Moosavi et al., 2012 and Zandi et al., 2011). Among the interaction between cutting and intra row spacing, leaf yield per hectare ranged from 1893.33-6904.62 kg. The interaction between C₂ x S₁ (two cuttings & 25 x 5.0 cm) gave the highest leaf yield per hectare (6904.62 kg). While, the combination C₁ x S₄ (one cutting & 25 x 12.5 cm) gave the lowest leaf yield per hectare (1893.33 kg).

Table - 2 : Effect of cutting and intra row spacing on leaf yield/ hectare (kg)

Cutting \ Spacing	S ₁	S ₂	S ₃	S ₄	Mean	Range
C ₀	-	-	-	-	-	-
C ₁	3299.33	2411.33	2041.33	1893.33	2411.33	1893.33-3299.33
C ₂	6904.62	5833.10	4262.33	3053.66	5013.42	3053.66-6904.62
Mean	5103.47	4123.71	3153.33	2474.99	3713.88	1893.33-6904.62
Range	3299.33-6904.62	2411.33-5833.10	2041.33-4262.33	1893.3-3053.66		
CD _(0.05)	CV	SE(+d)	C:Cutting		S: Spacing	
C: 504.56	C: 46.47	C: 231.84	C ₀ : No cutting		S ₁ : 25x5.0cm	
S: 715.21	S: 26.88	S: 328.11	C ₁ : one cutting (50 days)		S ₂ : 25x10.0cm	
CxS:1012.12	CxS:44.15	CxS:464.68	C ₂ : Two cutting (50 and 80 days)		S ₃ : 25x12.5cm	

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HOME STAYS IN UTTARAKHAND : A STEP TOWARDS ECOTOURISM AND SUSTAINABLE ENVIRONMENT

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ABSTRACT

Home stay tourism is famous in numerous destinations; it truly adds socio-cultural richness to the tourist's experience. For a state like Uttarakhand which possesses an abundance of tourism richness in remote communities, home stays are an attractive alternative option. As they not only promote ecotourism but are also environmental friendly. India is one such nation having wonderful tourist destinations. The northern region of India in the foothills of Himalayas lies the beautiful region to be named as Uttarakhand. It consists of hilly terrain and combination of rural and urban populations. The emerging concept of home stay tourism in Uttarakhand is directly connected with the rural society and their development. Home stay is the new concept towards ecotourism helping rural people, benefiting them economically also preserving their cultural heritage. This paper aims to study the comparison of rural and urban home stays in Uttarakhand and analyse the contribution of home stay on development of ecotourism. The study is carried on secondary data from Uttarakhand Tourism Corporation. It revealed that home stay tourism is an alternative stay for tourists in nature and with a feel of a homely environment and to know about Uttarakhand's diverse culture which is supporting Ecotourism & rural community economically as well as maintaining the green environment.

Keywords : Home stay, uttarakhand, ecotourism, tourist, rural

INTRODUCTION

Uttarakhand is a beautiful State of India, lying in the northern region at foothills of Himalayas. This state was carved out of the state of Uttar Pradesh on November 9, 2000 and was the

27th state of India full of natural beauty, consisting of dense forest, water resources, aromatic medicinal plants and a variety of flora and fauna. This place is one of the most liked tourist destinations. It consists of religious places such as Badrinath, Kedarnath,

Yamunotri, Gangotri and Haridwar, also places of snow-capped mountains, and places very appropriate for trek lovers.

Uttarakhand is divided into two regions, Garhwal region and Kumaon region. It consists of 13 districts in all lying in plane region and hilly region, with the interim capital Dehradun. It is the best tourist destination because of its climatic attractions in all Seasons of a year. During summers tourists can enjoy greenery and during winters they can experience snowfall, winter sports and snow trekking.

The emerging concept of home stay In Uttarakhand is a new attraction for tourists. Home stay is a beautiful way to spend holidays in urban as well as rural areas of Uttarakhand. Home stays are the best way to experience a particular place whether it's a city's popular travel destination or remote villages. One can Choose from living in ancient villas, bungalows, heritage buildings, village huts or Contemporary residences [newsroom.hyatt.com]. Home stay operations have become popular in urban areas, especially in rural areas of Uttarakhand because of Pandit Deen Dayal Upadhyay Home stay yojana giving higher priority to the economic enhancement of Uttarakhand local community.

Tourist activities are aimed to empower the local community economically, socially and psychologically. Thus, home stay operations should be focused on revitalizing cultural practices and rituals to be showcased to traveller. This will not only create attraction for tourists who wish to know the culture Of Uttarakhand and to explore diverse nature but also emphasise local youth to preserve the cultural heritage and natural environment of this region. Home stay's concept is environmentally friendly & is very helpful in developing ecotourism [ww.bbwc.co.uk 2022]. Uttarakhand has immense potential for tourism because of its geographical

personality like, landscape, and cultural heritage. (Uttarakhand tourism.gov.in)

This paper aims to study the comparison of home stays in rural and Urban areas of Uttarakhand and also highlights the benefits of home stay in ecotourism. This paper also highlights the Shortcomings of home stays in Uttarakhand region.

MATERIALS AND METHODS

In this study an effort has been taken to examine Secondary data on home stays in Uttarakhand. Study also covers the importance of home stay in ecotourism and cultural heritage.

Concept of Home stays

A home stay provides an opportunity to stay with a local family for a fee. It allows them to experience the local Community and culture of the place they are visiting. Home stays are different from hotels, hostels, and lodges. for the following reasons . Home stay allows you freedom by providing a Comfortable stay in a homely environment.

- The care is personal since there is only one family staying with the host. Guests are treated with care and extra attention is paid to their Comforts.
- Staying in Home stays will give tourists Chance to know their culture and traditions and experience to stay Close to nature
- Home stays are run by local people so they provide home cooked food unlike food served in restaurants and hotels
- Home stay is the best way to experience the famed Himalayan hospitality of Uttarakhand [uttarakhandtourism.gov.in]
- People from Uttarakhand are simple and follow traditions of "Atithi Devo Bhava" implies they believe "Guests are Gods "and so they welcome their guests with open heart and personal care and attention.

Deen Dayal Upadhyay Girah Awasa Home stay Development Scheme

This scheme was introduced to attract tourist to far flung tourist destinations along with the popular ones, enhance accommodation facilities at local level, generate employment for native people and provide an additional source of income to house owners with the objective to provide affordable and clean home stay to national and international travellers [pauri.nic.in/tourism-department]

Salient features of home stay:

- Purely residential
- Family head should be staying in house along with family
- Home stays should have minimum 1 or maximum 6 rooms for tourists.
- Under this scheme Government provide capital subsidy

Uttarakhand Home Stay Scheme Aid

Under this scheme government of Uttarakhand provide aid for establishment of home stays. This can be described as follows:

Home Stays in Uttarakhand

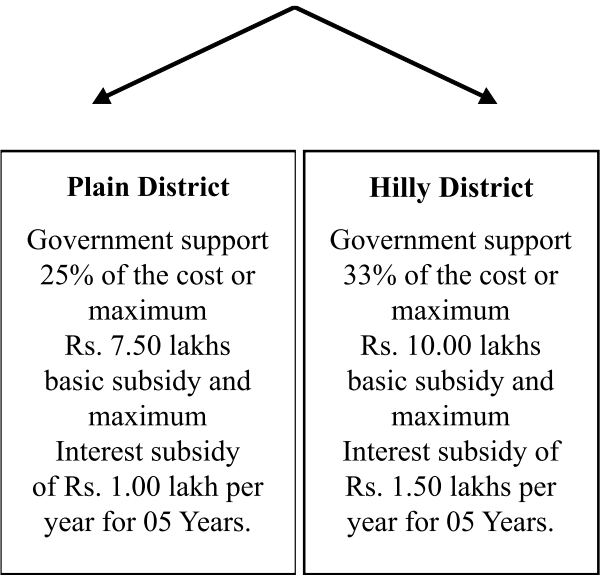


Table - 1 : District wise details of registered units under home stay scheme

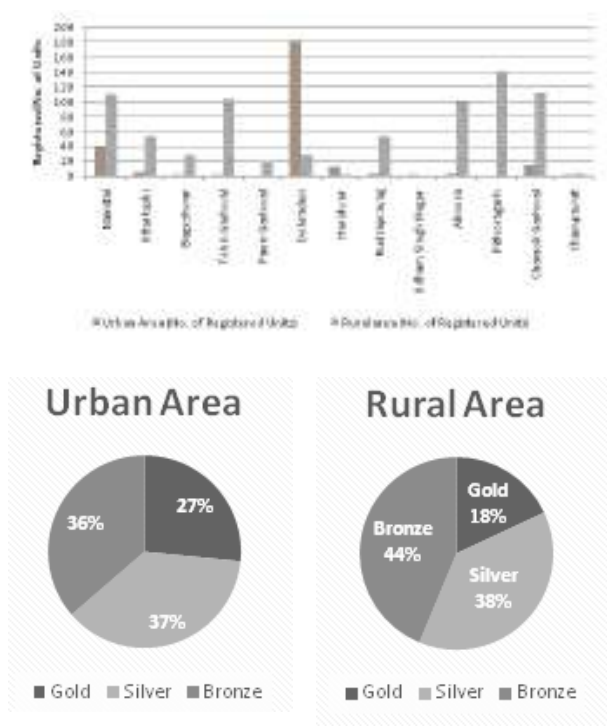
S.No.	Name of the District	Urban Area (No. of Registered Units)	Rural area (No. of Registered Units)
1.	Nainital	39	110
2.	Uttarkashi	6	54
3.	Bageshwar	1	28
4.	Tehri Garhwal	2	103
5.	Pauri Garhwal	0	21
6.	Dehradun	182	29
7.	Haridwar	12	1
8.	Rudraprayag	3	54
9.	Udham Singh Nagar	2	0
10.	Almora	3	100
11.	Pithoragarh	0	141
12.	Chamoli Garhwal	15	111
13.	Champawat	2	3
	Total	267	755

Source: <https://uttarakhandtourism.govt.in> (District wise details of registered units under home stay scheme, 2019)

Table - 2 : Categories of Home stay in rural and urban area of Uttarakhand

S. No.	District	Gold		Silver		Bronze	
		Urban	Rural	Urban	Rural	Urban	Rural
1.	Nainital	23	70	16	31	0	19
2.	Uttarkashi	0	1	2	21	4	32
3.	Bageshwar	0	0	1	3	0	25
4.	Tehri Garhwal	0	21	2	81	0	1
5.	Pauri Garhwal	0	5	0	8	0	8
6.	Dehradun	42	6	56	20	84	3
7.	Haridwar	0	0	7	1	5	0
8.	Rudraprayag	0	6	3	25	0	23
9.	Udham Singh Nagar	2	0	0	0	0	0
10.	Almora	0	20	3	72	0	8
11.	Pithoragarh	0	2	0	15	0	124
12.	Chamoli Garhwal	2	4	9	12	4	95
13.	Champawat	2	1	0	0	0	2
	Total	71	136	99	289	97	330

Source: <https://uttarakhandtourism.govt.in> (District wise details of registered units under home stay scheme, 2019)



Concepts of Ecotourism

According to The International Ecotourism society (TIES), ecotourism can be defined as "responsible travel to natural areas that conserve the environment, sustains the well-being of the local people and involves interpretation and education [www.conserve-energy-future.com, theprint.in/india/governance/]. Ecotourism is also known as green tourism, mindful travel and wildlife travel, nature tourism involving travel to destinations where flora, fauna & cultural heritage are the main attractions. Ecotourism helps to conserve the environment. Ecotourism has become more important in states like Uttarakhand. Uttarakhand is known for its greenery and gorgeous untouched natural beauty which has made it a beautiful tourist attraction from all over the world. The state is blessed with dense forests, snow-capped mountains, meadows, high altitude lakes, flora and fauna. Its beauty can be conserved by promoting ecotourism.

RESULTS AND DISCUSSION

Table (1) reveals there are more

establishments of home stay in rural area instead of Urban area of Uttarakhand except Dehradun district which has highest home stays in urban region.

Some states of Uttarakhand as Pauri Garhwal in urban area, Pithoragarh in urban area and Udham Singh Nagar in rural area lack in home stays establishments, which needs attention and have greater scope of home stays establishments.

Table (1) also reveals there are very few home stays in Haridwar district although it is a pilgrimage destination. It implies that Concept of home stay is not popular there may be because of lots of dharmshalas which provides free stays or very nominal fee against stay for travellers.

Rural areas of Nainital, Tehri Garhwal, Almora, Pithoragarh and Chamoli have more home stays, showing significant differences from other States of Uttarakhand.

Table (2) indicates contribution of Gold, silver and Bronze which is shown in pie diagram for urban and rural areas of states of Uttarakhand separately. Which gives clear indications that percentage of bronze category of home stays in rural areas are more than Gold & silver. In urban area of Uttarakhand percentage of silver and bronze categories are almost the same and contributes more than gold.

Ecotourism is one of the best boosting & promising tourism segments in the World today. Many countries in the world build up their economic advancement by this type of tourism. Ecotourism has a minimal negative impact on the environment. (Md.Anowar Hossain et.al. (2011)

It is economically, socially and environmentally Sustainable. Tourists want to stay closely with the local communities of ecotourism sites. They can know the tradition & culture of the local area as well as the natural beauties of the tourist places. Home stay Can give better chances to the tourists to enjoy this advancement. Uttarakhand has

suitable conditions to develop Home stays in the ecotourism sites of this region. In this context, there are some potential factors remaining in Uttarakhand for establishing home stays as:-

- Ecotourism resources and biodiversity: Uttarakhand is full of natural resources and rich in biodiversity sources. These are suitable for ecotourism and Home stay development in this area. Home stays give opportunities to the tourists for staying close to the ecotourism sites.
- Minimum environmental Impact. Home stays have developed in a small scale which needs short space and limited involvement. So, Home stay do not pollute the environment negatively.
- It requires fewer infrastructures so contributing negligible damage to environment and more benefit to rural community who cannot invest more in infrastructure.
- Showcase cultural performance: Cultural performances are an integral component of Home stay program. Ministry of tourism in Uttarakhand is funding and focusing on cultural performance to operate successful Home Stays opportunities for local people. People in Uttarakhand can operate Home stays easily by their limited capital and stimulate economy
- Development of tourist destination required lot of investment in terms of money exhausting natural resources building materials ,labour ex=etc. This is all is done at the cost of environment it not only deteriorate environment bit also burden financially so home stays are better option for maintaining better environment.

Finally choosing Home stay will be a step towards

- Helping Ecotourism
- Helping in enhancing rural, economy
- Helping in Conserving Local culture and tradition
- Helping in conserving green environment.

Some shortcoming of Home stay:

- **Lack of popularity:** Home Stays are still not popular. The barrier in its promotion is ineffective marketing. Professional marketing can lead to a flourishing home stay business.
- **Accommodation standard:** The accommodation standards of home stay are often low in Uttarakhand especially in rural areas. These standards do not meet international standards as hotels and resorts so they lack in attracting foreign tourists.
- **Hygiene of bathroom and Toilet:** Generally, Bathroom and toilet of home stays are not up to mark and are unhygienic having poor standards so travellers are not satisfied thus it is a barrier in progress of home stays.
- **Untrained home stay operators:** Home stays are run by local people and they are not professionals and experienced. Sometimes they lack in communicating Language, so knowledge of English Language and skilful hospitality can attract foreign tourists. But this is still a challenge to train home stay operators.

CONCLUSION

Home stays in Uttarakhand can be an alternative accommodation System for tourists. Home stays have become a positive catalyst to the entire community living here. It has been able to foster entire ecotourism of the region and promote sustainable development of the area uplifting all social, economic and environmental issues and

promotes ecotourism. Home stays will ensure employment and ecotourism thereby enhancing income opportunities for Local people of Uttarakhand.

The concept of home stays in Uttarakhand is in the developing phase. There are some shortcomings which need to be taken care in their promotion to be concisely pointed as:

- Accommodation should be of good quality to attract foreign tourists.
- Lack of publicity is a barrier in flourishing home stays operation.
- Hygienic conditions of toilets and bathrooms should be in priority as it is the minimum basic facilities for tourists, which they can't compromise.
- Training programs for hospitality and Communication skill development is a must for home stay operators.

Home stays are suitable for ecotourism development in Uttarakhand. It will be helpful for flourishing ecotourism sites as well as sites which have less infrastructures but splendid natural beauty. This new concept is environment friendly -giving comfortable Stay for tourists offering homemade Local cuisine, cultural knowledge, nature's enjoyment and hospitality away from artificial hospitality & luxury of hotels or resorts. Home stays promotes ecotourism and supports rural and urban people of this state economically.

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CONSTRAINTS FACED BY THE POTATO GROWERS IN PRODUCTION, STORAGE AND MARKETING OF POTATO CROP

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ABSTRACT

India is predominantly an agricultural country and potato is one of the major cash crops of India as well as Uttar Pradesh. The present study was conducted to identify the constraints faced by the respondents for cultivation, storage and marketing practices of potato during 2020-21 in purposively selected salon Block of Raibareli District Uttar Pradesh. 100 Potato growers were selected from five villages through proportionate random sampling method. A list of problems/constraints prepared at the time of data collection and among them six major problems related to potato cultivation and 8 problems related to storage and marketing facilities of potato were shortlisted according to respondent's response. The study revealed that the major constraints of potato production were lack of quality seed, high cost of fertilizers, price fluctuation at the time of harvesting, high cost of seed, non availability of inputs at proper time while the constraints related to storage and marketing facilities were no suitable local method of storage, shortage of storage facilities near the farm, lack of marketing facilities etc.

Keywords : *Storage facilities, marketing infrastructure, support price, constraints in potato cultivation and price fluctuation.*

INTRODUCTION

India is predominantly an agricultural country and potato is one of the major cash crops of India as well as Uttar Pradesh. Potato (*Solanum tuberosum* L.) is one of the important commercial cash crop commonly known as poor man's food and the king of vegetables. Potato is also a staple food in India after cereals for most of the population. Potato is grown about 120-150 countries throughout the

world. India has secured rank second after China in world 's potato production. The production of potato in India was 53 million tones during 2018-19. Potato is one of the widely cultivated horticultural crops of Uttar Pradesh. Uttar Pradesh is the leading states of potato production followed by West Bengal and Bihar. Potato is an annual crops and belongs from Solanacea family. In eastern part of India, it is consumend in boiled form with the name of Chokha

and generally eaten with Dal- Bhat (Rice). Potatoes are frequently served whole or mashed as a cooked vegetable and are also ground into potato flour, used in baking and as a thickener for sauces. The tubers are highly digestible and supply vitamin C, protein, thiamin, and niacin. Being a major vegetable, it has the huge importance to the processing industry as well. Many processed products of potato such as potato chips, French fries, potato flakes etc. are available in market (Raghuvanshi et al.2018). Potato is an economical food for Indian population and provides a source of low cost energy to human diet. In nutshell we can say Indin food basket is incomplete without potato. In Uttar Pradesh the cultivation and consumption of potato is continue increasing is constantly and the potato growers has facing many constraints in potato production. With this background the present study is conducted with the major objective to identify the major constraints

faced by the growers for cultivation, storage and marketing practices of potato.

MATERIALS AND METHODS

The present study was conducted in Raibareli district of Uttar Pradesh. A two - stage stratified random sampling technique was used to select the block. Cluster of village and farmers. A list of all the 18 blocks of the Raibareli district was prepared and out of 18 blocks one block Salon having the highest acreage under potato was selected purposively. A list of all villages were prepared along with acreage under potato cultivation five village were selected randomly using probability production to size (PPs) considering acreage under potato cultivation in the village. Ultimately. 100 number of farmers were selected proportionally from each category of farmers. Details of the farmers selected for study, are given in Table -1.

Table - 1 : Village - Wise total farmers under different size group in the study area

S.No.	Name of village	Size of holding							
		Marginal (below 1 ha)		Small (1 to 2 ha)		Medium (2 to 4 ha)		Total	
		T	S	T	S	T	S	T	S
1	Kanhpur	48	12	16	04	08	02	72	18
2	Lahurepur	52	13	20	05	08	02	80	20
3	Kamal ganj	64	16	16	04	08	02	88	22
4	Panditkapurwa	48	12	20	05	08	02	76	19
5	Kamaluddinpur	56	14	24	06	08	01	84	21
Total		268	67	96	24	40	09	400	100

The study based on reference agriculture year 2020-21 and simple tabular analysis pattern was adopted to identify the constraints. A list of problems/constraints prepared at the time of data collection and among them six major problems related to potato cultivation and 8 problems related to storage and marketing facilities of potato was shortlisted according to respondent's response.

RESULTS AND DISCUSSION

Constraints faced by the respondents for

cultivation, storage and marketing practices of potato

A list of problems/constraints prepared at the time of data collection and among them six major problems related to potato cultivation and 8 problems related to storage and marketing facilities of potato was shortlisted according to respondent's response. Tabular analysis and rank assignment was done on the basis of response of different size of farms i.e. marginal, small and medium.

Major problem and constraints faced by potato growers of study area were basically divided in two part i.e.

- [1] Problems related to cultivation of potato
- [2] Problems related to storage and marketing facilities of potato

It was observed from the table 4.8 that price fluctuation at the time of harvesting was felt to be the first major constraints by hundred per cent

respondents. The second most important problem in the study area was heavy incidence of disease and pest by the ninty five per cent respondents. Lack of quality seed found the third most problem of study area followed by High cost of fertilizers, Non availability of inputs (seed, fertilizer, labour) at proper time and high cost of seed were the major problems with the rank fourth, fifth and sixth respectively.(Table 2)

Table - 2 : Constraints faced by the respondents for cultivation of potato on different size of sample farms: (n=100)

Sl. No.	Particulars	Size of sample farms			Total	Ranks
		Marginal	Small	Medium		
1	Lack of quality seed	65	22	07	94	III
2	High cost of fertilizers	62	19	08	89	IV
3	Price Fluctuation at the time of harvesting	67	24	09	100	I
4	High cost of seed	55	21	08	84	VI
5	Non availability of inputs (Seed, fertilizer, labour) at proper time	58	21	07	86	V
6	Heavy incidence of disease and pest	62	24	09	95	II

The constraints faced by the respondents for storage and marketing practices of potato on different size of sample farms is given in table 4.9. All of the respondents i.e hundred per cent, showed problem of no minimum support price fixed by government for their produce. The second most important problem faced by the respondents in study

area was greening in potato tubers followed by shortage of storage facilities near the farm, lack of marketing facilities, no awareness about marketing trends, no suitable local method for storage, lack of transportation facilities and electricity problem in storage unit respectively (Table 3)

Table - 3 : Constraints faced by the respondents for storage and marketing practices of potato on different size of sample farms:(n=100)

Sl. No.	Particulars	Size of sample farms			Total	Ranks
		Marginal	Small	Medium		
1	No Suitable local method of storage	61	18	06	85	VI
2	Electricity problem in storage unit	52	15	05	72	VIII
3	Shortage of storage facilities near the farm	65	21	07	93	III
4	Greening in potato tubers	64	22	08	94	II
5	No awareness about marketing trend	62	21	07	90	V
6	Lack of marketing facilities	66	19	06	91	IV
7	Lack of transportation facilities	62	15	05	82	VII
8	No MSP fixed by government	67	24	09	100	I

Suggestion: major suggestion received from the respondent side to overcome the mentioned problem is given below

- The major inputs particularly HYV seeds, Fertilizers, insecticides and pesticides etc. Should be made available to the farmers just before the growing period which will be helpful in reducing the cost of cultivation and will increase the production of potato.
- Price fluctuation is the major problem of study area so government should take necessary action through different organization to control the price system and government should ensure that price of the potato will remain uniform all round the year.
- Government or local agencies/KVK should provide the training to potato growers /to create the awareness among the potato growers regarding technical use of insecticide and pesticide. Through this farmers can protect their crop from heavy incidence of disease and pest.
- Technincal knowledge of the farmers on different issues of potato cultivation needs to be increased so that they can produce potatoes properly.
- Government should made the policy on minimum support price of potato or should develop a price support mechanism for potato growers.
- To control the labour and other cost, modern technology should be undertaken. Extension worker/village worker should provide the training to potato growers for diffusion and adoption of modern technology.
- The development of market infrastructure like road, electricity supply, irrigation

facility, communication and transport should be increased to get better and remunerative price at market.

- Government should control the price of agricultural inputs at time of growing.
- The credit facilities should be availbe at right time and in adequate amount to adopt the modern technologies.
- Government should organize the agriculture camp through different institution and organization (SAUs, KVK, Agriculture office) to percolate the information about price and marketing trends of potato market.
- Government should come up with different programmes and policies which will help the farmers in selling the potato crop in distant markets to get better and remunerative returns and should check the exploitation by middlemen.
- Short educational/awareness visits of potato growers should be arranged to various agricultural/ horticultural universities, research stations, krishi vigyan Kendra (KVK) and fields of progressive farmers which would be helpful in technical know –how of potato cultivation and to solve the other constraints.

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ECONOMIC PERFORMANCE OF MURRAH BUFFALOES IN BHUTA BLOCK OF DISTRICT BAREILLY

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ABSTRACT

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The present study was conducted in Department of Animal Husbandry and Dairying, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The sample of study included 60 Murrah Buffaloes which were maintained by different land holding of farmers, viz. large categories, medium categories, small categories, marginal categories and landless laboures categories of farmers. The results revealed that the milk yield was higher (10.00 kg) in large farmers followed by medium, small then marginal and lower (8.00 kg) in landless categories of farmers. Similarly, the maintenance cost of large farmers is high (Rs.54489.32) than medium followed by small then marginal and lower (Rs.47349.00) in landless farmers. The G.I. return\lactation was higher (Rs.65548.74) in large farmers and lower (Rs.49185.50) in marginal farmers. The input output ratio was higher (1:2.19) in large farmers followed by medium, small and then landless and lower (1:1.91) in marginal categories of farmers. The problem of breeding was common. The larger land holding size is found to be beneficial to get more income.

Keywords : Murrah buffaloes, economic, performance.

INTRODUCTION

India, the leading country with the highest buffalo population in the world with a total of 109.85 million. Buffaloes have a greater impact in the agricultural sector and contribute nearly 51% of India's milk production Boro *et al.*, (2020). Dairy sector plays a vital role and has high priority in the improvement of economy when compared to other

livestock sectors. Buffaloes were reared for triple purpose like milk, meat and drought Perisic *et al.*, (2015). In livestock, buffalo is considered as an integral component of Indian agricultural economy and it has significant role in livelihood and food security. In developing country like India with 108.7 million populations of buffaloes contribute 51.06% (74.71 million tons) to the total milk production in

the country and there are only 13 registered breeds and it ranks 1st in world Jakhar *et al.*, (2017).

Indian buffaloes are one of the major sources of milk supply with thrice yield comparative to cows. According to previous studies, 47.22 million milch buffaloes contribute from the 55 % of total production of milk in India Yadav *et al.*, (2017). There are about 13 indigenous standard breeds of buffaloes, which are well known for their milking qualities. Globally, the population of buffalo has reached to 130 million, they are considered as an important variety but as an undervalued asset. In developing country like India it is considered as premier animal of an dairy industry and it has contribution of 50 % of total milk production Chitra *et al.*, (2016). From the Asian domesticated animals, Asian buffalo is known for its promising potential for production.

MATERIALS AND METHODS

The present study was conducted during 2020 to 2021 in selected villages of Bhuta block of Bareilly District to assess the economic performance of Murrah buffaloes. The choice of block was based on the fact that Government Veterinary Hospital, Bhuta block of District Bareilly and BIAF center are working for popularization and up lift of dairy animals in the locality. Besides, extension training center is also located near the block, which acts as a catalytic agent in promoting the dairy development in entire block area. Agriculture finance and live stock insurance scheme through Government agencies have already been launched to encourage live stock keeping in the area. The Bhuta block is located close to District head quarter of Bareilly. The milk and milk products of this vast consuming center is met mainly by milk producers of the neighbouring and society. During the survey a list of villages in which adequate numbers of Murrah buffaloes are maintained was prepared. From such list, 10 villages were selected

randomly for the present Study.

The information collected from 6 farmers from each land holding categories of farmers. There were a total 60 Murrah buffaloes, number of buffaloes was 12 in each categories of farmers respectively. The selected milk producer family was interviewed and necessary information collected through carefully pre designed questionnaires by survey methods throughout the year.

The variable cost as the name denotes, varies with the change in production. The items of such cost for present study are labour charge, feed and fodder value, medicine and salt, ropes, service charge, etc

RESULTS AND DISCUSSION

The results on cost of maintenance of milch animals have been presented in the (Table-1). The cost of maintenance of Murrah buffaloes per animal per lactation in different categories of farmers from large farmers to landless laboures were Rs. 54489.32a \pm 32.63, 54042.85b \pm 24.67, 52635.52c \pm 39.49, 50676.04 \pm 33.63, and 47349.20e \pm 34.27 respectively.

The fixed cost as an important item is the maintenance of murrah buffaloes were worked out in different categories of households based on land holding size and result are presented in (Table-1). The fixed per lactation cost per animal of murrah buffaloes was worked out and found to be same like value of animal was same as Rs.60000 and shed rent also was same Rs.7000 per lactation per milch buffaloes in different categories of households.

In rearing the Murrah buffaloes for milk production the three cost items i.e. fixed cost, feed and labour cost constitute almost the total cost of maintenance. The results further revealed that the large and medium size farmers spent more money (Rs.54489.32a \pm 32.63, 54042.85b \pm 24.67 respectively) on cost of maintenance of their milch animals than other categories landless laboures cost

Table - 1 : Item wise maintenance cost per buffalo per lactation in different categories of farmers

Particulars	Categories of farmers					SE (diff)	CD (0.05)
	Large	Medium	Small	Marginal	Landless		
Fixed cost (Rs.)							
a)Animal book value	60000	60000	60000	60000	60000	-	-
b)Shed rent	7000	7000	7000	7000	7000	-	-
Feed cost:							
Dry feed	5621.20	4963.40	4255.76	4186.00	4532.84	-	-
Green feed	3552.12	3761.42	3540.16	3875.04	3779.36	-	-
Concentrate	16146.00	16146.00	15069.60	13445.00	9867.00	-	-
Labour cost (Rs.)	7970	7970	7970	7970	7970	-	-
Vaterinary cost (Rs.)	1000	1000	1000	1000	1000	-	-
Service charge (Rs.)	200	200	200	200	200	-	-
Miscellaneous charge (Rs.)	1000	1000	1000	1000	1000	-	-
Total cost (Rs.)	42489.32	42042.82	40635.52	38676.04	35349.20	-	-
Interest on animal (Rs.)	12000	12000	12000	12000	12000	-	-
Grand total (Rs.)	54489.32 a ±32.63	54042.85 b ±24.67	52635.52 c ±39.49	50676.04 d ±33.63	47349.20 e ±34.27	19.22	39.58

Significant at P < 0.05

money was low 47349.00e±34.27 Rs. Per lactation of milch buffaloes. Chauhan and Balishter (2008), Kumr *et al.* (2017) have reported that the maintenance cost of Murrah buffaloes was lower than that of crossbred cows. Contrary to it, such observations are in consonance with the present study The results cost of milk production of Murrah

buffaloes in various categories of house holds are presented in (Table-2). The total maintenance cost of animal per day divided by milk yield per day to arrive at the cost of milk production per liter per day. The cost of milk production of Murrah buffaloes were Rs 18.22 c, 18.53 c, 19.13 b, 20.92 a, and 19.80 b, in large farmers group to landless laboures

Table - 2 : Income and expenditure per animal per lactation and cost of milk production in different categories of farmers

Particulars of Cost	Categories of Farmers					SE (diff)	CD (0.05)
	Large	Medium	Small	Marginal	Landless		
Maintenance cost of animals (Rs.)	54489.32	54042.85	52635.5	50676.04	47349.20	-	-
Expenditure per animal/day(kg)	182.24	180.74	176.03	169.50	158.35	-	-
Milk Production/ day (kg)	10.00	9.75	9.20	8.10	8.00	-	-
Lactation milk production (kg)	2990.00	2915.25	2750.80	2421.90	2392.00	-	-
Milk rate (Rs.)	40.0	40.0	40.0	40.0	40.0	-	-
Income/ day (Rs.)	400	390	368	324	320	-	-
Lactation income (Rs.)	119600	116610	110032	96876	95680	-	-
Income from dung/ month (Rs.)	2990	2990	2990	2990	2990	-	-
Income from dung/ day (Rs.)	10	10	10	10	10	-	-
Total income from milk & dung/day\ animal(Rs.)	410 a	400 a	378 b	334 c	330 c	10.8	23.9
Net return/ day (Rs.)	227.76	219.26	201.98	164.50	171.65	-	-
Net return / month (Rs.)	6832.80	6577.80	6059.40	4935.00	5149.50	-	-
G.I.return/ lactation (Rs.)	68558.74	65110.24	60392.02	49185.50	51323.35	574.7	1185.1
Cost of milk per kg production (Rs.)	18.22 c	18.53 c	19.13 b	20.92 a	19.80 b	0.54	1.11
Input output ratio	1:2.19	1:2.15	1:2.09	1:1.91	1:2.02	-	-

Significant at $P < 0.05$

farmers group categories of farmers, respectively.

It is evident from the (Table-2) that the average input output ratio of murrah buffaloes was 1:2.19, 1:2.15, 1:2.09, 1:1.91 and 1:2.02 in group I to group V categories of farmers respectively. The

result of study found that the input output ratio in case of marginal categories of farmers as expected was found to be lower than that of other categories of farmers and the higher input output ratio was found to be 1:2.19 in large categories of farmers. The result

of present study on input output ratio of murrah buffaloes in different categories of farmers are higher than observed by Shaayani *et al.* (2007).

CONCLUSION

The present investigation on "Economic performance of Murrah buffaloes" maintained by the different categories of farmers, which are described here under: The per lactation milk yield of murrah buffalo was higher in large categories of farmers followed by medium then small then marginal and lower in landless farmers. The lactation length was same of murrah buffaloes all categories of farmers. The dry period of Murrah buffaloes was also same in all groups. The maintenance cost of murrah buffaloes was high in large categories of farmers as compared to others. The cost of milk production was higher in large farmers. The nutritional status of murrah buffaloes in terms of DM, DCP and TDN considerable shortage was observed in different categories of farmers. The veterinary problems faced by farmers keeping murrah buffaloes were of almost same nature and magnitude. The present studies explicitly indicated that the input ouput ratio of murrah buffaloes were profitable in different categories of farmers. The present study indicated that the input output ratio was found to be higher in large categories of farmers. So the land holding size of farmers is affected the milk production of murrah buffaloes.

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