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MINERALS PROFILE OF URINE COLLECTED FROM PANTJA GOATS

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ABSTRACT

Pantja breed of Indian goats is a recently recognized breed with accession no. INDIA_GOAT_2420_PANTJA_06024. A study was undertaken during autumn and winter seasons of the year 2016-17 on 5 Pantja goats, reared at goat unit of GBPUAT, Pantnagar (Uttarakhand), to study mineral profile of their urine. Overall mean values for magnesium, calcium, potassium and sodium were 7.89 ± 0.48 µg/ ml, 31.06 ± 2.08 mg/ dl, 1326.60 ± 47.30 mEq/ L and 56.13 ± 3.40 mEq/ L, respectively. Only calcium content was significantly different among goats and it ranged from 25.24±1.01 to 42.57±7.90 mg/ dl. The values for zinc, cobalt, iron, copper and manganese content in Pantja goat urine were 0.260 ± 0.032, 0.872 ± 0.114, 0.873 ± 0.070, 0.088 ± 0.031 and 0.144 ± 0.012 µg/ ml, respectively. Significant differences (P<0.01, P<0.05) existed in their values due to season, being higher in winter, for iron (0.471±0.050 vs. 1.274±0.080 µg/ ml), cobalt (1.053 ± 0.200 vs. 0.597 ± 0.100 µg/ ml) and manganese (0.170 ± 0.017 vs. 0.117±0.020 µg/ ml).

Key words: *Pantja goats, urine, minerals*

INTRODUCTION

Minerals play vital role in the activities of enzymes and hormones, as constituents of body fluids and tissues, regulators of cell replication and differentiation. These are the structural components of the body as well. Macro minerals like calcium, magnesium, potassium and sodium, etc. are present at larger levels in the animal body and are required in larger amounts in the diet (>100 ppm), whereas micro minerals like chromium, cobalt, copper, fluorine, iodine, iron, manganese, molybdenum, selenium and zinc are often referred to as trace minerals as these are present at low levels in the body and thus are required in smaller amounts in the animals diet (< 100 ppm). After energy and protein, minerals are the major nutrients required and should be given priority in order to optimize reproduction (Bindari, *et al.*, 2013). Kidneys are the principal organs that filter out waste products from the blood. However, some useful substances are also washed away from body along with wastes in the form of urine. This is, therefore, the utility of urine lies. Pantja breed of Indian goats is a recently recognized breed with accession no. INDIA_GOAT_2420_PANTJA_06024. Information on the constituents of goat urine as such in general and Pantja goats in particular is scanty in literature in comparison to cow's urine. Hence, present study was undertaken.

MATERIALS AND METHODS

Present investigation was undertaken in adult female goats reared at Goat unit, Department of Livestock Production and Management, College of Veterinary and Animal Sciences, Pantnagar

managed under AICRP-Uttarakhand Goat Unit, sponsored by C.I.R.G (I.C.A.R), Farah (Mathura). All the goats were managed uniformly and provided with feed and fodders as per the guidelines (Table 1).

The experiment was carried out on five female Pantja goats and they were trained to urinate at morning hours using sprayer of cold water in their perineal region. Their perenial region was clipped to collect urine samples aseptically. A total of 50 samples (10 samples from each goat) from 5 goats were collected and analyzed (25 in autumn and 25 in winter during the year 2016-17). Then collected samples were preserved using formalin (4 drops per 100 ml urine) and stored at 4°C in refrigerator for about a month i.e. till mineral analysis was attempted. Urine samples were analysed for calcium and magnesium using research grade kit (Erba Diagnostic Kit and Sigma Aldrich); for Copper, Iron, Manganese, Zinc, and Cobalt using atomic absorption spectrophotometer (SensAA GBC Scientific Equipment) and for sodium and potassium in flame photometer (SYSTRONICS, Digital Flame Photometer 130) at Physiology and Biochemistry Departments of College of Veterinary Sciences, GBPUAT, Pantnagar and Indian Veterinary Research Institute, Izatnagar, respectively.

RESULTS AND DISCUSSION

The findings obtained from the present investigation for various macro and micro minerals in the urine of Pantja goats is as follows (Table 2 and 3):

Sodium: Sodium is the main extracellular (outside cells) cation in animals and is important for nerve function in animals. The overall mean value of sodium in Pantja goat urine was 56.13±3.40 mEq/ L and it did not differ significantly among goats and season (Table 2). Kamalu *et al*. (2003) reported sodium content in urine of cattle as 20.33±4.95 mEq/ L which was lower than sodium content in Pantja goat urine.

Potassium: The overall mean value in the urine of Pantja goats was observed as 1326.60±47.89 mEq/ L. The value of potassium content did not differ significantly among goats and season (Table 2). The value observed in cattle was higher as reported by Singh *et al*. (1983) in cows (12.32±0.76 mEq/ L) and by Justin and Sharma (2004) in Sahiwal (4.42±0.04 mEq/ L) and crossbred heifers (4.66±0.05 mEq/ L).

Calcium: Calcium is the most abundant mineral in the body. It is required for vascular contraction and vasodilatation, muscle function, nerve transmission, intracellular signaling and hormonal secretion, though less than 1% of total body calcium is needed to support these critical metabolic functions. The mean value for calcium content in the urine of Pantja goats was 31.06±2.08 mg/ dl. The value differed significantly ($P<0.05$) among goats (range: 25.24±1.01 to 42.57±7.90 mg/ dl) but not due to season (Table 2). Calcium is an essential structural element in skeletal tissues. The individual variation among goats may be due to individual predisposition towards calcium intolerance.

Magnesium: Magnesium is an essential nutrient which is involved in many biochemical functions. It has a structural role in nucleic acids and ribosomal particles, required as an activator for many enzymes and has a role in energy producing oxidative phosphorylation. The mean value for magnesium in Pantja goat urine was observed 7.89±0.48 µg/ ml. The value did not differ significantly among goats as well as seasons (Table 2). Dhiman (2006) reported magnesium content in the urine of Barbari nannies as 5.96±0.01 µg/ ml. The reported magnesium contents in HF and Jersey crossbred and Sahiwal heifers' urine as reported by her were 31.04±0.01 and 23.71±0.01 µg/ ml.

Zinc: Zinc is found in cells throughout the body and is needed for the body's defensive (immune) system to properly work. It plays important role in cell division, cell growth, wound healing, and the breakdown of carbohydrates. The mean value for zinc in Pantja goat's urine was observed as 0.260±0.032 µg/ ml. The value did not differ significantly among goats and season (Table 3). Zinc

content in Barbari nannies, HF and Jersey crossbred and Sahiwal heifer's urine as reported by Dhiman (2006) was 0.216±0.001, 0.299±0.003 and 0.258±0.001 µg/ ml. Urine of Sahiwal and crossbred heifer's contained iron as 0.305±0.019 and 0.251±0.008 µg/ ml (Justin and Sharma, 2004).

Cobalt: Cobalt is needed as part of vitamin B_{12}. In ruminants microbes use it to synthesize B_{12}. The mean value for cobalt content in the urine of Pantja goats as observed was 0.872±0.114 µg/ ml. Significant difference (P<0.05) in cobalt content in Pantja goats urine existed during autumn and winter season, being significantly higher during winter (1.053±0.200 *vs.* 0.597±0.100 µg/ ml) (Table 3). Cobalt is an essential element for haemopoisis and individual variations are possible due to this factor.

Iron: Iron is a cofactor of hemoglobin, and thus very important. The mean iron content in Pantja goats' urine as observed was 0.873±0.045 µg/ ml. The value did not differ among goats, but differed significantly (P<0.01) between seasons, being higher in winter (0.471±0.050 *vs.* 1.274±0.080), may be due to difference in the iron content of grasses in pasture (Table 3). Dhiman (2006) reported

Table 1. Feeding management of adult Pantja goats

Season	Grazing hours	Green fodder available on pasture/ paddock	Concentrate mixture	Water
Autumn	Morning 0800 - 1030 hrs Evening 1400 -1630 hrs	Ber (*Zizphus indicus*), Guava (*Psidium guajava*) Neem (*Azadirachta indica*), Berseem (*Trifolium alexandrium)*	Crushed maize - 300 g Wheat - 200 g Gram chuni- 200 g Groundnut cake- 200 g Mineral mixture- 20 g Salt- 10 g (150 g daily in evening)	Made available all the time in paddock
Winter	Morning 0900 - 1130 hrs Evening 1400 - 1630 hrs	Oats (*Avina sativa*) Ber (*Zizphus indicus*) Guava (*Psidium guajava*) Neem (*Azadirachta indica*) Berseem (*Trifolium alexandrium)*		

Table 2. Sodium, potassium, calcium and magnesium content in the urine of Pantja goats

Effect	Obs.	Sodium (mEq/L)	Potassium (mEq/L)	Calcium (mg/dl)	Magnesium (µg/ml)
Goat: 135	10	63.65 ± 6.09	1407.00±117.39	33.34 ± 4.85	7.81 ± 1.26
136	10	45.50 ± 4.20	1434.00±089.65	28.46 ± 2.30	7.03 ± 0.75
137	10	49.75 ± 4.66	1173.00±115.23	25.69 ± 1.46	8.67 ± 1.01
138	10	58.05 ± 7.72	1336.00±097.67	42.57 ± 7.90	9.45 ± 1.33
139	10	63.70 ± 8.31	1283.00±106.97	25.24 ± 1.01	6.52 ± 0.95
		NS	NS	*	NS
Season:					
Autumn	25	56.18 ± 2.94	1332.80 ± 70.45	30.92 ± 3.31	7.39 ± 0.65
Winter	25	56.08 ± 4.87	1320.40 ± 64.60	31.09 ± 2.62	8.40 ± 0.73
		NS	NS	NS	NS
Overall	**50**	**56.13 ± 3.40**	**1326.60 ± 47.30**	**31.06 ± 2.08**	**7.89 ± 0.48**

NS- Non significant; * Significant (P<0.05)

iron content in the urine of Barbari nannies as 1.820±0.001µg/ ml, HF and Jersey crossbred and Sahiwal heifer's as 1.308±0.001 and 1.624±0.001µg/ ml. Justin and Sharma (2004) reported iron content in Sahiwal and crossbred heifers' urine as 2.745±0.218 and 3.273±0.096 µg/ ml.

Copper: Copper act as cofactor to many proteins, in elastin and collagen (promotes structural integrity of collagen and normal elastin formation in the aorta), normal myelination of brain cells and spinal cord and electron transport chain. The mean value of copper in the urine of Pantja goats was 0.088±0.031 µg/ ml. The value did not differ significantly due to individuality and season (Table 3). Dhiman (2006) reported copper content in Barbari nannies, HF and Jersey crossbred and Sahiwal heifers' urine as 0.176±0.001, 0.067±0.006 and 0.186±0.001 µg/ ml. Justin and Sharma (2004) reported copper content in Sahiwal and crossbred heifer's urine as 0.485±0.044 and 0.327±0.022 µg/ ml, respectively, which were higher than the content in Pantja goat's urine.

Manganese: Manganese is cofactor to many proteins (bone formation-cartilage formation, antioxidant, synthesis of polysaccharides and glycoproteins, glucose metabolism and cholesterol synthesis). The mean value for manganese in the urine of Pantja goats was 0.144±0.012 µg/ ml. The value did not differ significantly among goats but differed significantly (P<0.05) between seasons, being higher during winter (0.170±0.017 *vs.* 0.117±0.020 µg/ ml), which may be due to availability of seasonal grasses in the pasture (Table 3). Manganese content in the urine of Barbari nannies, HF and Jersey crossbred and Sahiwal heifers as reported by Dhiman (2006) was 0.176±0.001, 0.067±0.006 and 0.185±0.001 µg/ ml. Justin and Sharma (2004) reported manganese content in Sahiwal and crossbred heifer's urine as 0.009±0.001 and 0.016±0.003 µg/ ml.

As such minerals play important role in reproduction, immunity and proper growth of gut micro flora in ruminants and urine being an ultra-filtrate of blood and containing useful macro and micro minerals. Judicious use of urine may open new avenues in livestock waste management, recycling of minerals and supplementing necessary macro and micro minerals in deserving candidates, in fresh or distillate form.

Table 3. Sodium, potassium, calcium and magnesium content in the urine of Pantja goats

Effect	Obs.	Zinc (µg/ml)	Cobalt (µg/ml)	Iron (µg/ml)	Copper (µg/ml)	Manganese (µg/ml)
Goat:135	10	0.359 ± 0.090	1.214 ± 0.475	0.944± 0.168	0.183 ± 0.153	0.140 ± 0 .280
136	10	0.358 ± 0.120	0.760 ± 0.118	0.941 ± 0.122	0.106 ± 0.040	0.109 ± 0.017
137	10	0.206 ± 0.002	0.726 ± 0.257	0.933 ± 0.151	0.058 ± 0.010	0.177 ± 0.034
138	10	0.180 ± 0.003	0.790 ± 0.175	0.720 ± 0.202	0.057 ± 0.010	0.176 ± 0.038
139	10	0.202 ± 0.003	0.634 ± 0.098	0.824 ± 0.181	0.036 ± 0.001	0.116 ± 0.013
Season		NS	NS	NS	NS	NS
Autumn	25	0.227 ± 0.040	0.597 ± 0.100	0.471 ± 0.050	0.113 ± 0.044	0.117 ± 0.020
Winter	25	0.294 ± 0.045	1.053 ± 0.200	1.274 ± 0.080	0.063 ± 0.044	0.170 ± 0.017
		NS	*	**	NS	*
Overall	**50**	**0.260 ± 0.032**	**0.872 ± 0.114**	**0.873 ± 0.070**	**0.088 ± 0.031**	**0.144 ± 0.012**

NS- Non significant; * Significant (P<0.05), * Significant (P<0.01)

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STUDIES ON DEVELOPMENT OF INSTANT CHUTNEY FROM BAMBOO SHOOTS (SANEIBI, *BAMBOO ARUNDINACEA*)

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ABSTRACT

Bamboo shoot is one of the common food items in many countries and its popularity is growing day by day as main or supplementary food stuff. So, this paper was carryout to standardize the procedure for preparation of instant chutney with bamboo shoot by using shade dried tender culms of bamboos. Instant chutneys were found to reconstitute well in cold water. After seasoning, the bamboo shoot chutneys had all characteristics of fresh chutneys.

Keywords: *Bamboo, bamboo shoot, iInstant chutneys.*

INTRODUCTION

Bamboo shoots are the young and tender culms of bamboo that are consumed for various foods items after harvesting. The freshly harvested shoot is cream yellow in colour, has a strong smell and is sweet in taste. However, all species of Bamboo shoots available worldwide are not edible (Choudhury et al., 2010). In India, bamboo shoots are harvested annually in Sikkim (26.2 tonnes), Meghalaya (435 tonnes) and Mizoram (426.8 tonnes).Around 20-30 million tonnes of bamboo shoots are utilised for annual production of canned bamboo shoots (Bhatt et al., 2003).About 5% of growing stock of bamboo resource in India is only available in Nagaland from 448000 ha of land. In Manipur bamboo shoot is consumed as fresh or fermented. Fermented bamboo shoot known as Soibum/Soijin and Soidon have been considered as relisable dish by people. They have their unique taste and texture (Giri et al., 1994).

Chutneys and pickles are foods adjuncts, used as side dishes in Indian meals. They serve as good appetizers and hence are prepared domestically in every household. Of late, they have assumed commercial importance and also find export market (Satyanarayana et al., 2001). Therefore, an attempt was made to provide these chutneys in conveniently packaged dry form so that these would provide a sample of chutney after reconstitution with all standardisation of the recipe and process for the preparation of instant chutneys from bamboo shoot in convenient packs in order that the shelf life period is extended and typical characteristics are retained.

MATERIALS AND METHODS

Fresh tender bamboo shoot, red chillies, onion, garlic, tamarind, citric acid, cardamom, cinnamon, cumin, salt, sugar, white sesame seeds and vegetable oil were procured from the local market.

PREPARATION OF FRESH CHUTNEYS

Tender bamboo shoot after harvesting were

removed outer scale/sheath, peel, cut into slices and remove bitterness by boiling with water 2 to 3 times for half an hour each times for by changing water or soaking in water for overnight. The bamboo pieces prepared in this way are chopped finely or minced them in mincer. Stalks of green chillies, skin of garlic cloves were removed. Tamarind was soaked for 15 min. in water in ratio 1:2, squeezed and the extract was collected. Cloves, garlic, onion and cumin were first fried in the oil. Put chopped bamboo shoot & sugar and cooked for 10 min. under low flame. Sesame seeds were roasted and powdered along with salt and red chillies separately in an electrical grinder and added to the fried cooking material. Continue cooking till the material has softened and add tamarind extract and boil again to desire consistency.

PREPARATION OF INSTANT CHUTNEY

Tender bamboo shoot slices were boiled in water 2 to 3 times for half an hour each times for by changing water in order to remove bitterness and dried to approximately 18% moisture in shade by spreading in perforated trays with free air flow. Sesame seeds were roasted under low flame till light brown in colour. Red chilli, deskinned garlic, finely chopped onion, cumin, cardamon and cinnamon were fried in a small quantity of oil at around 165^{o}C for 2-3 min. All these fried material along with the shade-dried bamboo shoot, salt and citric acid were ground in an electrical grinder to get 30 mesh free flowing instant chutney powders. Unit packs of 100g were made in HPPE pouches (200 gauge) stored at 28-37^{o}C with RH 32-48% to study the physico-chemical and organoleptic changes during storage.

Red chilli (8gm)

Deskinned garlic (5gm)

Chopped onion (5 gm)

Cumin (5gm)

Cardamon & Cinnamon (3gm)

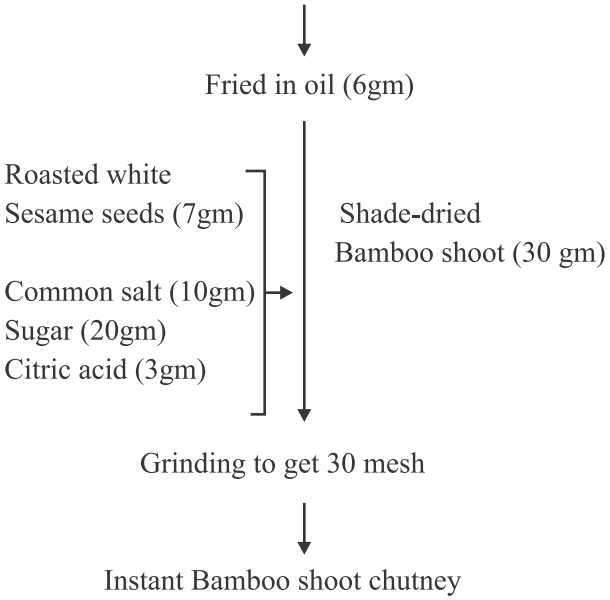

Fig.1. Flow chart for the preparation of instant bamboo shoot chutney.

CHEMICAL ANALYSIS

Moisture, total ash, crude fibre were determined as per standard methods (AOAC 1960). Total carbohydrates were determined by difference method, protein by Kjeldhal method using a conversion factor of 6.25, total fat by Soxhlet extraction method using pretoleum ether, crude fibre by AOAC (1984) method. pH was determined by reconstituting 10g of chutney powder with 100 ml distilled water.

Organoleptic evaluation : The sensory quality evaluation of the reconstituted chutneys from these instant chutney powders were done by comparing with chutneys prepared from fresh shoots (control) by a panel of 6 panellists using a 9-point Hedonic scale with a maximum score of 9 for " like extremely" and minimum of 1 for "dislike extremely" (Amerine et al. 1965).

Reconstitution of instant chutney powder at room temperature: The instant bamboo shoot powder was reconstituted with 2 times of its weight of water. It reconstituted to twice in volume in 10 min. There was no change in reconstituted volume

even after one hour. After 10 min the reconstituted chutneys were seasoned with cumin and garlic and left under low flame for 5 min to get the thick pasty consistency of fresh chutneys. Varying proportions of bamboo shoot, sesame seed, salt, red chilli (dry), garlic, onion, cumin, cardamon, cinnamon, citric acid and vegetable oil were investigated to prepare fresh and instant chutneys from bamboo shoot. The recipe was standardized for fresh and instant chutneys from bamboo shoot through a panel of judges (Fig 1).

Table 1. Food Value Of Bamboo Shoot (*bamboo Arundinacea*) And Instant Bamboo Shoot Chutney

Parameter (%)	Bamboo shoots (fresh)	Instant B.S.chutney
Moisture	88.8	4.07
Total Fat	0.8	4.60
Total Protein	3.9	1.8
Total Ash	1.06	2.4
Crude Fibre	8.5	7.38
Carbohydrate	5.70	3.2
Energy (k cal/100g)	43.0	22
*Average of replications each.		

Table 2. Physico-chemical Changes In Instant Bamboo Shoot Chutneys During Storage At Ambient Temperature.

Storage period (Month)	Moisture (%)	pH
Initial	4.07	3.85
1	4.08	3.88
2	4.15	3.86
3	4.42	3.80

RESULTS AND DISCUSSION

Bamboo shoots are low in cholesterol and saturated fats contents (total fats 0.5%), are high in carbohydrate (5.70%), protein (3.9%), minerals (1.1%) and moisture (88.8%) (Satya et al., 2009). It is a good source of Vitamin E (ά- Tocopherol), Vitamin C, B6, thiamine, Riboflavin, niacin and dietary fibres like hemicelluloses, cellulose, pectin, lignin (Part & John, 2009). With 17 different types of amino acids, it contains over 10 kinds of mineral elements i.e., Cr, Zn, Mn, Mg, Ni, Co. Cu; Lysine, Germaclinium, many nutritious and active materials.

Table 1. presents the comparative rate of chemical composition of Bamboo shoot and instant chutney. It shows that they were rich in crude fibre and fat. The calorific value of instant bamboo shoot was 22 kcal/100gm. The moisture content of instant Bamboo shoot chutneys was slightly increases and pH was found almost constant during the storage period (Table2). There was no change of instant bamboo shoot chutneys during the storage period of 3 months with respect to colour, texture, flavour and taste. So, the products had a shelf life of more than three month at ambient temperature when packed in flexible pouches.

CONCLUSION

Based on the results obtained in the present study it might be concluded that instant chutneys with better physic-chemical and shelf life can be prepared from tender bamboo shoot with their typical characteristic qualities.

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EFFECT OF VERNALIZATION AND FUNGICIDAL SEED TREATMENT ON YIELD AND SEED QUALITY OF WHEAT (*TRITICUM AESTIVUM* L.) UNDER KANPUR CONDITIONS

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ABSTRACT

The field experiments were conducted at at New Dairy Farm, Kalyanpur, and seed quality parameters were assessed in the Seed Testing Laboratory of Department of Seed Science and Technology, C. S. Azad University of Agriculture and Technology, Kanpur during Rabi season of 2013-14 and 2014-15. Experiment was conducted on Wheat variety of Shatabdi (K-307) to evaluate the effect of Vernalization and Fungicidal seed treatment. The effects of seed treatment and vernalization duration found significant for all the characters during both the years and pooled analysis except for germination (under open field), leaf size, plant height, number of seeds per plant, No. of seed per ear head, seed yield per plant in pooled analysis. The maximum germination, number of tillers per plant, leaf size (length × width) plant height were recorded with treatment F_2 (With fungicide (Vitavax@2.5g/kg seed) during both the years and pooled analysis. The interaction effects of seed treatment and vernalization duration found non-significant for all the characters during both the years and pooled analysis except for germination (under open field), leaf size, plant height, number of seeds per plant, No of seed per ear head, seed yield per plant in pooled analysis

Key words: *Vernalization, fungicidal seed treatment, wheat.*

INTRODUCTION

Botanically wheat is known as *Triticumaestivum* L. belongs to the family Poaceae. It is a hexaploidi.e.6x (2n)=42 crop having 7 basic chromosomes number. Wheat is a gold-colored grass that grows to approximately 1 m. in height, bearing clusters of sharp bristles and hard grains at its tip.This subspecies has a long, cylinder spike which is somewhat flattened. Spikelet's are 2 to 5 flowered, relatively far apart on the stem and nearly erect. Awns either lacking or less than half an inch long. Stem centers are generally hollow but may be pithy.

Globally, wheat contributes approximately 30 per cent of the total cereal production and about 60 per cent of daily protein requirement and more calories to world diet (Matter*et al*., 1970). Wheat contains 12.6-14 g protein, 1.5-1.9 g fat, 68-71 g carbohydrate, 12.2 g dietary fibre, 360 kcal energy, 39 mg calcium, 239 mg magnesium, 842 mg phosphorus, 892 mg potassium, 12.29 mg zinc and 6.26 mg of iron, 17-20 per cent of the daily requirement in human body.

Grown all over the world, wheat covers more of the earth's surface than any other cereal

crops,However, it takes more land space than other cereals , based on a three years average it is only the third-largest cereal crop , behind maize and rice .In terms of production, China is the largest producer of wheat followed by Indiain the second position. The India's share in world wheat production is 13.53 per cent. India is likely to produce 95.85 million tonnes of wheat during 2013-14 , compared to 93.31 million tonnes last year(ICAR, 2015).

Vernalization is the low temperature treatment given to water soaked seeds, slightly germinated seeds, or seedlings to hasten the time of flowering of plants that will develop from them.Chouard, 1960has defined vernalization as the " acquisition or acceleration of the ability to flower by a chilling treatment."

In the history of agriculture farmers observed a traditional distinction between "winter cereals," whose seeds require chilling and "spring cereals," whose seed can be sown in spring and flower soon thereafter (Chouard, 1960). The word "Vernalization" is translation of "Jarovization," a word coined by *Trofim Lysenko* to describe a chilling process, he used to make the seed of winter cereals behave like spring cereals (Jarovoe and Chouard, 1960). Scientists had also discussed, how some plants needed cold temperatures to flower as early as the 18th century, with the German plant physiologist *Gustav Gassner* often mentioned for his 1918 paper (Chouard, 1960 and Nils, 1985).

Early researches on vernalization focused on plant physiology, the increasing availability of molecular biology has made it possible to unravel its underlying mechanisms (Amasino, 2004). For example, longer days as well as cold temperatures are required for winter wheat plants to go from the vegetative to the reproductive state. The three interacting genes are called *VRN1, VRN2 and FT(VRN3)*, (Trevaskis , 2007).

In some variety, vernalization serves to shorten time to flower by shortening the vegetative period of plant, which helps in production of more than one crop in a year. By sowing winter crop in spring season, plant can be protected from freezing injury due to very low winter temperature. Long summer requiring plant (e.g. cotton, maize) can now be grown in temperate areas with the short summer requiring plant. (Sinha, 2010).

There are many techniques available to increase the production of wheat but they are costly. So the farmers have compulsion to adopt it, and consequently the cost of wheat production goes high. But the vernalization technique is very easy and less costly as compared to other to enhance the yield of the crop therefore this topic has been taken for study.

MATERIALS AND METHODS

The field experiments were conducted at New Dairy Farm, Kalyanpur, Kanpur and seed quality parameters were assessed in the Seed Testing Laboratory of Department of Seed Science and Technology, C. S. Azad University of Agriculture and Technology, Kanpur during Rabi season of 2013-14 and 2014-15 to assess the seed yield and quality parameters of Wheat variety Shatabdi (K-307). The experiment was laid out in Factorial RBD. The crop was sown on 5 December 2013, using the seed rate of 100 kg/ha. A recommended dose of NPK 120:60:40 kg/ha were applied. There were 9 treatment combinations with Four vernalization durations viz. 15 days(V_1), 20 days(V_2) , 25 days(V_3) , 30 days(V_4) @ 5^{0}C temperature , 2 doses of Fungicidal seed treatmentviz without fungicide(F_1) and with fungicide(F_2)(vitavax @2.5g/kg seed) except control. One hoeing and weeding was done 30 days after sowing (DAS). On 10 randomly selected plants, yield contributing and morpho-physiological characters were recorded from each plot i.e. Germination (under field conditions),Number of tiller/ plant, Leaf size (length x width), No. of ear head/ plant, Plant height, Days to 50% flowering, Number of days taken to attain physiological maturity, No. of seeds/plant, No. of

seeds/ear head, Seed yield/plant.

RESULTS AND DISCUSSION

Seed treatment with fungicide and without fungicide did not change significantly all the characters except germination under field condition, number of seeds per plant, in pooled analysis. This was mainly due to the fungicide not had significant differences for the characters.

The maximum germination, number of tillers per plant, leaf size (length × width) plant height were recorded with treatment F_2 (With fungicide (Vitavax@2.5g/kg seed) followed by F_1 (without seed treatment) and minimum in control during both the years and pooled analysis.

The yield attributes *viz.,* number of ear head per plant, number of seeds per plant, number of seeds per ear head and seed yield per plant were highest recorded with treatment F_2 (With fungicide (Vitavax@2.5g/kg seed) followed by F_1 (without seed treatment) and minimum in control during both the years and pooled analysis. The maturity traits did not influenced significantly by seed treatment. The maximum days taken to 50 % flowering, days taken to physiological maturity were observed in F_2With fungicide (Vitavax@2.5g/kg seed)82.27, 133.67 days followed by F_1 (without seed treatment)82.17 days 133.46 days and minimum in control during both the years and pooled analysis. Boldizsar*et* al(2011), Robertson *et* al (1996),Ribeiro*et* al (2009), Amasino (2004).

The duration of vernalization influenced significantly germination under field condition maximum germination (1980.63) recorded with V_4 (duration of vernalization for 30 days) which was significantly superior over control, V_1, V_2 and V_3, 1790.38, 1921.63, 1928.44 and 1946.31 respectively.

. Minimum germination (under open field) is recorded in control during both the years and pooled analysis. The number of tillers per plant, influenced non-significantly due duration of vernalization, maximum number of tillers per plant was observed with the vernalization treatment V_4(10.33)and minimum number of tillers per plant in control during both the years and pooled analysis. Duration of vernalization was found non-significant for leaf size, maximum leaf size was observed with the vernalization treatment V_3(41.57)and minimum in control (39.04). For plant height, duration of vernalization was influenced plant height significantly, maximum plant height recorded with the exposure of vernalization for 30 days which was significantly superior over control, V_1 and V_2 and at par with exposure of vernalization for 25 days and minimum was in control during both years and pooled analysis.

The duration of vernalization found non-significant effect on number of ear head per plant, maximum number of ear head per plant was observed with the vernalization treatment V_4 (duration of vernalization 30 days) 9.70 during both years and pooled analysis. Whereas, duration of vernalization influenced significantly, maximum number of seeds per plant was recorded with the vernalization treatment V_4 (duration of vernalization 30 days)513.32. Whereas, duration of vernalization influenced significantly, maximum seed yield per plant (26.47 g) was recorded with the vernalization treatment V_4 (duration of vernalization 30 days) and minimum seed yield was obtained from control during both the years (18.42)and pooled analysis. Nishiura*et* al (2014), JingJuan*et* al (2014), Weir *et* al (1984), Ablaza et al (2010).

The present investigation indicated that the duration of vernalization effects the plant growth and yield attributes significantly which reveals that the increasing of vernalization duration also increased the plant height other growth parameters and yield attributes as number seeds per plant, number of seeds per and seed yield per plant.

CONCLUSION

Seed treatment with fungicide and without