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Periodic Research

Response of Potassium to Growth and Yield of Pearlmillet (ICTP 8203) in Vertisol

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Abstract

A field experiment was conducted during the kharif season of 2013-2014 in Vertisols of rainfed areas of central India to study the effect of application of graded doses of potassium (15, 30 and 45 kg K2O ha-1) on growth and yield of pearlmillet (Pennisetum glaucum (L.) R. Br.). Five treatments of different levels of potassium were tested in Vertisols possessing available potassium level up to 340.3 kg ha-1. Application of 60:30:00 kg NPK ha-1+45 kg K2O ha-1 recorded the maximum plant height, number of functional leaves, leaf area, girth of main stem and dry matter accumulation with highest values of yield attributes viz., number of effective tillers plant-1, number of earhead plant-1, mean length of earhead, circumference of earhead, weight of earhead g plant-1, weight of grains g plant-1 and test weight. Similarly, it enhanced the pealmillet grain and stover yield to an extent of 1690 and 3591 kg ha-1.

Keywords : Grain Yield, Growth Parameters, Potassium, Pearlmillet, Stover Yield, Vertisol, Yield Attributes.

Introduction

Pearlmillet (Pennisetum glaucum (L.) R. Br.) is the fourth most important cereal and widely grown in India. Now a days, in the context of changing climate, this crop is mostly identified as contingent crop in the central India. Its importance can't be ignored because it is the most drought tolerant and has the highest water use efficiency under drought stress. Pearlmillet grain is the staple diet and nutritious source of vitamins, minerals, protein, carbohydrates, while pearlmillet stover is a valuable livestock feed. India is the largest producer of pearlmillet in world, both in terms of area (about 8.69 million ha) and production (10.05 million tonnes) during 2011-12. As far as management practices are concerned, being a short duration crop, a very little attention and efforts are required to grow the pearlmilllet .

Based on the estimated status of available K in the Vertisols, these soils were rated as high to very high in K. Believing over these values, the rate of K application to these soils was reduced to a great extent, resulting in imbalance of the soil nutrient status owing to certain synergestic and antagonistic configuration of the mineral elements. That has reflected quiet evidently in the yield performance of the agricultural crops including cereals, causing yield stagnation mostly in pearlmillet.

Among the essential plant nutrients, potassium assumes greater significance since it is required in relatively larger quantities by plants and besides increasing its yield, it immensely improves the quality of the crop produce. Potassium being rightly placed in the list of major nutrients is actively involved in the process of protein synthesis and activation of major enzymes in the pearlmillet, besides, it regulates the plant water balance and maintains the osmotic pressure in the plant cells. It prevents lodging, and provokes disease resistance in the plant.

The crop response to K in Vidarbha region of Maharashtra has been changing with time and soils are showing the signs of K depletion as use of N and P without K is progressively increasing. Therefore, understanding the present status of K use and removal and the resultant K balances with changing agro-climatic conditions enable us for undertaking the corrective measures to bridge the nutrient gap and help to maintain soil health and ensure the food and nutritional security of present and future generations (Satyanarayana, 2010). Moreover, as optimal K nutrition is of particular benefit to crops in providing drought tolerance during intermittent dry spells in the rainfed environment, application of K may introduce additional benefits to farmers, beyond remedying the deficient soil K status.

In Maharashtra, during 2007-08 the total nutrient consumption was 103 kg ha^{-1}. Although about 0.421 mt of K was added, the removal was very high at 1.483 mt, leaving a negative balance of 1.062 mt of K

(Patil et al., 2001). The negative balance of K is highly predominant in almost all the states which imply that the use of K fertilizers is suboptimal in most cases. Various input and output K balances indicated negative balance of K to the extent of 3 million tonnes annually. Further, refinement of K balances are required by including residue addition in the regions of conservation agriculture practices, green leaf manuring and non-conventional K sources, which may result further reduction of overall negative K balance in Indian agriculture. Due to continuous mining and limited use of K fertilizers, soils are showing quiet encouraging response to K fertilizers along with N, P fertilizers.

In view of the above, it was proposed to study the effect of various levels of potassium on growth, nutrient uptake and yield of pearlmillet. The present study examines the impact of increasing levels of K fertilization on growth parameters, yield attributes and yield of rainfed pearlmillet variety ICTP 8203 grown on the vertisols of Vidarbha region of Maharashtra state.

Materials and Methods

A field experiment was conducted during kharif season of 2013-2014 at Research Farm, Department of Soil Science and Agriculture Chemistry; Dr.mPDKV Akola (22.42^{0}N, 77.02^{0}E) located 307.4 m above mean sea level. The experimental site is situated in sub-tropical zone of semi arid tropics with extreme weather condition having hot and dry summer and cold winter. The rainfall during cropping period was 557 mm as against the mean annual rainfall of 741 mm.

The investigation was carried out over the Vertisol having organic carbon 4.82 g kg^{-1}, pH 8.12, EC 0.28 dSm^{-1}, calcium carbonate 6.72%, available N, P and K 192.30, 16.88 and 340.30 kg ha^{-1}, respectively. The experiment consisting of five nutrient treatment combinations was carried out in four replications with randomized block design. The treatments were- (1) NF (no fertilizer), (2) RDF (recommended dose of fertilizer, 60:30:00 NPK kg ha^{-1}), (3) RDF+15k (60:30:00 + 15 kg K_2O ha^{-1}), (4) RDF+30k (60:30:00 + 30 kg K_2O ha^{-1}) and (5) RDF+45k (60:30:00 + 45 kg K_2O ha^{-1}).

The crop was sown at 45m x 10m spacing in 18 m^2 plot (3.6m x 5.0m) in fourth week of June and harvested in fourth week of September. The cultivation practices were followed as per the Crop Production Guide of Dr. Panjabrao Deshmukh Krishi Vidyapeeth Agriculture University. The fertilizer sources were; urea for N (46% N), single super phosphate for P (16% P) and muriate of potash for K (60% K_2O). Full dose of P and K and half dose of N were applied to pearlmillet as basal dose while sowing. The remaining dose of N was top dressed at 45 days after sowing.

ICRISAT's high-iron pearlmillet variety ICTP-8203 was released as Dhanshakti in Maharashtra state of India. Dhanshakti is the first mineral biofortified crop cultivar. ICTP-8203 is open-pollinated variety of pearlmillet developed at ICRISAT in 1982 from selection within an Indian landrace from northern Togo. The sowing was undertaken after receipt of sufficient rains by drilling method. Prior to sowing, the seeds were treated with Trichoderma @ 4g kg^{-1}. The fertilizers were broadcasted as per treatments. The weeds were controlled by giving one hand weeding and one hoeing. The crops were kept free from weeds. Harvesting was done manually when the crop showed physiological maturity symptoms and the grains were completely matured. The harvesting was done by cutting the earheads.

Growth parameters and yield attributes were recorded as per standard procedures. The plant height measured in cm from ground level of plant to the base of flag leaf of main shoot. Girth of main stem was measured at third internode of the plant. The biometric observations was recorded at 20 DAS, 40 DAS, 60 DAS, 80 DAS and at harvest. Finally, the yield attributes were recorded at the time of harvest of pearlmillet.

Aim of Study

To quantify the response of various doses of potassium on growth and yield of pearlmillet.

Results and Discussion

Growth Parameters

Plant Height

Plant height being a measure of overall plant growth, respond highly to any degree of change in the management practices. As observed from the data on plant height recorded at harvest of pearlmillet (Table 1), plant height differed significantly at harvest, defining the necessity of K fertilization in Vertisols. Significantly highest plant height was recorded with RDF+45k (79.27 cm) and RDF+30k (76.78 cm), both being statistically similar with each other. It was followed by RDF+15k and RDF. The lowest plant height (58.75 cm) was recorded in NF.

The reduction in plant height in treatments RDF and NF could be ascribed to the potassium deficiency in the plant causing increased amount of abscisic acid (ABA) and reduced amount of cytokinin accumulation in the plant. In the presence study the addition of K might have been enriched the available K which ultimately increased its availability near the root zone, resulting in the faster growth due to higher uptake of potassium. Similar results were also obtained by Mizrahi (1980).

Mean Number of functional Leaves Per Plant

Though the number of leaves produced per plant is a genetic character of the variety, management practices strongly affects the expression of genetic code of the plant and as such, during the present investigation the various fertilizer treatments significantly affected the mean number of functional leaves (Table 1) when recorded at harvest of pearlmillet. Maximum number of leaves (21.18) was recorded with treatment RDF+45k. However this treatment was statistically similar with treatment RDF+30k recording 20.63 leaves plant^{-1}. Treatment RDF+15k recorded intermediate value of functional leaves, whereas treatment receiving no fertilizer (NF) registered the least number (13.58) of functional leaves plant^{-1}.

The production of functional leaves have a direct relationship with availability of major nutrients in balanced amount. As the treatment receiving RDF+30k and RDF+45k provided nutrients to the plant in a balanced manner, it could have reflected in more absorption of these elements from the soil resulting in production of higher number of functional leaves. Hence it can be inferred that the application of K to vertisols plays an important in production of functional leaves and their by accumulation of photosynthates in the plant body. This elevated food material is then translocated towards production of reproductive bodies. Similar observations in respect of increased functional leaves due to addition of K are reported by Mangal et al. (2013) and Anand Swarup (1995).

Leaf Area Per Plant

Growth of leaves in horizontal and vertical directions is contributed while calculating the leaf area which is highly dynamic in nature and varies according to the nutritional status of the plant body. The production function of the plant is heavily dependent on the exposed green portion of the leaf intersecting incoming solar radiation. As revealed from the mean values presented in the data at Table 1, significant influence of varying levels of fertilizers over the leaf area was found at crop harvest stage. RDF+45k recorded significantly highest leaf area (26.65 dm^2 $plant^{-1}$) which was followed by RDF+30k (26.27 dm^2 $plant^{-1}$), both being at par with each other. RDF and RDF+15k were found to be intermediate in recording the value of leaf area. The response of treatment NF to leaf area to was minimum and hence recorded the least value (15.21 dm^2 $plant^{-1}$).

Role of potassium in promoting photosynthetic activity is well known. Potassium increases cell expansion by regulating the solute potential, reflecting in induced rate of leaf expansion and leaf area. Therefore in present investigation, the leaf area was found to be increased with the addition of graded doses of potassium. Similar findings were also reported by Brar et al. (2012).

Girth of Main Stem

The stem girth was measured at third internode of the main stem and it indicates the strength of the stem and it's resistance to lodging. Furthermore, the plant reserves of carbohydrates are mainly consolidated in the stem, indicating adequate stock of reserved food material. Therefore, increased girth of main stem of plant roots and shoots is always preferred. The observed data on main stem girth (cm) presented in Table-1 reveals significant response of pearlmillet to the varying levels of fertilizer and graded levels of K. At harvest of the plant the maximum main stem girth of 3.76 cm was recorded with RDF+45k, which was followed by RDF+30k (3.55 cm), both being statistically similar with each other. RDF and RDF+15k recorded intermediate values (3.21cm and 3.31cm, respectively). As against this, the response of NF to the increment in stem girth was found significantly lowest (2.53 cm).

The increase in stem girth of pearlmillet under RDF+45k and RDF+30k may be due to the induced cell expansion resulting from added dose of k, which also brings sturdiness to the plant and reflects in increased root development. Hence, it can be inferred that stem thickness depends largely on adequate application of potassium to the soil. These results are in agreement with Brar et al. (2012).

Dry matter Accumulation Per Plant

Dry matter is the function of vegetative and reproductive development of the plant body. Plant having the ability to develop vegetatively, also bears the capacity to convert it into development of reproductive plant parts in present of sufficient moisture. Therefore, it is imperative to study the dry matter, which plays a crucial role while investigating response of varying doses of fertilizers. The observed values of total dry matter accumulation (g $plant^{-1}$) (Table-1) reveals that, dry matter increased significantly with RDF+45k by recording the highest accretion of dry matter (47.83 g $plant^{-1}$) at harvest, where as 45.16 g $plant^{-1}$ of dry matter was obtained with RDF+30k, both being statistically similar with each other. The response of other treatments to dry matter accumulation was in the order of RDF+30k>RDF>NF.

As the response of pearlmillet plant in respect of plant height, number of functional leaves, leaf area and stem girth was maximum with treatment RDF+45k, it may have reflected in obtaining the higher values of dry matter in that treatment. As the basic role of K is directly related to multiplication of plant cells, hence it is obvious that the plant will function better when it will be provided with balanced dose nitrogen, phosphorus and potassium. This also indicates that in vertisols, especially under semi-arid condition, the supply of K to an extent of 45 kg K is essential for obtaining higher dry matter $plant^{-1}$. These results are in confirmation with Mansoor et al. (2010), Brar (2007) and Sarma (1991).

Root Volume

Unit growth of plant roots exhibit their potential to withdraw the required amount of nutrients from the soil solution. Their healthy growth is moreover suggestive of improved soil physical, chemical and biological status. Hence, the study of root volume was carried out (Table-1) to scrutinize the effect of treatment differences and observed that varying levels of fertilizers significantly affected the root volume when measured while harvesting the crop. Significantly highest root volume (19.40 cc) was figured out with RDF+45k. It was followed by RDF+30k (18.70 cc). Both these treatments found statistically similar. Other fertilizer treatments did not reached to the level of significance when compared with former treatments.

Higher root volume with RDF+45k specify that there may be balanced supply of the essential plant nutrients from the rhizosphere. The higher root volume with this treatment may also be credited to higher production of photosynthesis and carbohydrates through enhanced assimilation processes.

Yield Attributes

Mean Number of Effective Ttillers $Plant^{-1}$

The mean number of effective tillers (Table-2) was 3.18 $plant^{-1}$. Varying levels of K as compared to RDF and NF responded differentially in producing effective tillers. Significantly highest effective tillers (3.94) were recorded by RDF+45k which was followed by RDF+30k (3.63), both being statistically similar with each other. RDF recorded 3.01 tillers $plant^{-1}$, while significantly lowest number of effective tillers (2.20) was found with treatment NF.

Number of Earheads $Plant^{-1}$

Significantly highest number of earheads (3.93) were found with RDF+45k (Table-2). This treatment was statistically similar with RDF+30k producing 3.59 earheads $plant^{-1}$. The lowest number of earhead (2.22) were obtained with NF, where as RDF and RDF+15k were found intermediate.

Mean Length of Earhead

As observed from the values presented in Table-2, statistically longest mean earhead (21.25 cm) was recorded with RDF+45k and the second best treatment was RDF+30k with length of earhead to an extent of 21.18 cm, and these two treatments were found at par with each other. Statistically lowest value of length of earhead (16.45 cm^2) was recorded with treatment NF. The response other treatments was in between the maximum and minimum values, mentioned above.

Mean Girth of Earhead

Significantly highest girth of earhead (10.85 cm) was observed with RDF+45k (Table-2), showing statistically similarity with RDF+30k (10.73 cm). Statistically lowest value of girth of earhead was that of 8.04 cm with treatment NF.

Weight of Earhead

According to data presented in Table-2, varying doses of fertilizer significantly affected the weight of earhead $plant^{-1}$. The highest weight of earhead (24.09 g) was recorded with RDF+45k. The next best treatment was RDF+30k with 23.78 g weight of earhead. The reducing order of treatments in terms of weight of earhead was RDF+15k>RDF>NF.

Weight of Grains Per Plant

It was highest to an extent of 18.45 g with RDF+45k and lowest of 13.14 g with treatment NF (Table-2). It is worth to mention that, in spite of receipt of rains more than their normal values; the grain filling did not affected to any extent, as fortunately, there was a short dry spell during the grain filling stage.

Test Weight

Varying levels of fertilizer influenced the test weight, significantly (Table-2). Treatments RDF+30k and RDF+45k, both being at par with each other, recorded the highest values of test weight (12.99 g and 13.07 g, respectively). Similarly, RDF and RDF+15k being at par with each other, recorded the intermediate values of test weight. Significantly lowest test weight of 11.24 g was recorded with NF.

The results discussed for the yield attributes of pearlmillet reveals that, there is a positive correlation between the higher dose of K and yield attributes as shown by pearlmillet plant. The important plant processes that are influenced by K are the photosynthesis and translocation of carbohydrates by improved utilization of water, sunlight and nitrogen. Further, K play as important role in enhancing stomatal resistance, activation of enzymes and resistance to abiotic stresses. When the graded level of K increased from 0 to 45 kg K with an increment of 15 kg each per treatment, the response of yield attributes also improved in a similar manner i.e. positively and linearly. This might have due to the favourable influence of K on translocation of food products from vegetative parts of the plant to the sink i.e. to the reproductive plant bodies. Similar findings were also reported by Brar et al. (2007), Sarma (1991), Jat (2000), Khushwaha et al. (2007) and Yadav (2007).

Grain and Stover Yield

Response of the various plant parameters to the imposed treatments are cumulatively reflected in the final plant product, i.e. in the grain and stover yield of the plant. From the respective data presented in Table-3 and it's graphically depiction in Fig-1, reveals that, treatments consisting varying levels of K along with recommended dose of fertilizer exhibited significant response in pearlmillet plant when estimated in terms of grain and stover yield. Significantly highest grain yield of 1690 kg ha^{-1} was registered with RDF+45k. The second best treatment which produced 1660 kg ha^{-1} of grains was RDF+30k. Statistically there were no differences between the values obtained with these two treatments. RDF and RDF+15k also found similar with each other, producing 1281 kg ha^{-1} and 1380 kg ha^{-1} of grains. The lowest of 707 kg ha^{-1} grain was registered with treatment NF.

Alike trend of treatment differences was observed under stover yield also. The highest stover yield was that of 3591 kg ha^{-1} and the lowest of 1765 kg ha^{-1} with treatments RDF+45k and NF, respectively.

From the above results it is evident that there is 31% and 29% yield increase due to addition of 45 and 30 kg K respectively, over the RDF. This increment in yield in treatments RDF+45k and RDF+30k indicates higher conversion of photosynthesis into carbohydrates i.e. a better source : sink relationship. It also proves the theory that K plays an important role in the synthesis of enzymes and growth hormones in the plant cells. Thus, it can be assumed that; additional supply of potassium increases the total productivity in pearlmillet by making available the elemental potassium to the plant roots, either from the exchangeable, non-exchangeable sites, or from in-solution sources. The stover yield increment over RDF is also evocative to the fact that K stimulates the formation of high storage capacity through higher photosynthesis. These results are in conformity with Almodares (2008).

References

1. Almodares A., Reza Taheri, III Min Chung and Majid Fathi, 2008, Effect of nitrogen and potassium fertilizers on growth parameters and carbohydrate contents of sweet sorghum cultivars. Journal environment biology 29(6): 849-852.
2. Anand Swarup, 1995. Phosphorus and potassium fertilization of pearlmillet and grown on a reclaimed saline soil. Journal potassium research. 11(2):185-192.
3. Brar M. S., 2007. Evaluation of the effect of potassium application on the yield and quality of crops under an intensive sunflower, maize- pea cropping system in Punjab, India. e-ifc no. 12, June 2007 : 5-8.
4. Brar, M. S., Preeti Sharma, Amandeep Singh, and S. S. Saandhu, 2012. Nitrogen use efficiency (NUE), growth, yield parameters and yield of maize (zea mays) as affected by K application. e-ifc no. 30, March 2012 : 3-6.
5. Jat, M. L. and R. C. Gautam, (2000). Effect of summer ploughing and in-situ moisture ploughing practices on growth and yield of rainfed pearl millet . Indian J. Agron. 45(4) : 722-727.
6. Khushwaha B. B., K. K. Koul, and V. Singh, (2007) Performance of kharif sorghum under integrated nutrient management system. Indian journal dryland agriculture research and development . 2007 1: 32-36.
7. Mangal Chand Bunker, A. M. Patel, Mukesh Kumar Man and Shaukat Ali, 2013. Influence of integrated nutrient management on productivity and quality of single cross hybrid maize. Advance research journal crop improvement**.** 4(1**)**: 54-58.
8. Mansoor Azam, Ejaz Ahmad Waraich , As im Pervaiz and Fahim Nawaz, 2010. Response of a newly developed fodder sorghum (bicolor l. monech) variety (f-9917) to NPK application.

Pakistan journal life and society science 2010, 8(2): 117-120.
9. Mizrahi, Y., (1980). The role of hormones in plant adaptation to stress conditions. In: Physiological aspects of crop productivity. International potash institute, Berne, Switzerland. P. 125-136.
10. Patil, V. D., L. P. Pholane, and P. B. Adsul, 2001, Plant nutrient mining in agro climatic zones of Maharashtra. Fertilizer News, 46(7):43-54.
11. Satyanarayana, T., 2010. State-wise approach to crop nutrient balances in India. proc. int. conf. role potassium balanced nutrition OUAT, Bhubaneswar, Orissa, India.
12. Sarma, P. S. and G. Anantha Subramanian, 1991. Response of Sorghum to applied potassium under rainfed conditions. Journal potassium research. 7(1): 67-70.
13. Yadav, S. S., S. Singh, Abha Tikoo, and J. S. Yadav, 2007. Studies on Potash responses to field crops in light textured soils of southern Haryana, India. e-ifc no. 13, Sept. 2007. p. 4-7.

Table No. 1

Plant Height (Cm), Number of Functional Leaves, Leaf Area (Dm^2), Girth of Main Stem (Cm), Dry Matter Accumulation (G) and Root Volume (Cc) At Harvest Of Pearl Millet As Influenced by Various Fertilizer Treatments

Treatments	Plant height	Number of functional leaves	Leaf area	Girth of main stem	Dry matter accumulation	Root volume
NF	58.75	13.58	15.21	2.53	27.08	9.60
RDF	71.35	19.08	23.62	3.21	39.04	12.30
RDF+15k	73.76	19.24	24.64	3.31	42.65	15.50
RDF+30k	76.78	20.63	26.27	3.55	45.16	18.70
RDF+45k	79.27	21.18	26.65	3.76	47.83	19.40
SE(m)+	0.837	0.282	0.230	0.073	1.024	0.367
CD (5%)	2.653	0.837	0.741	0.219	3.153	0.810
GM	71.98	18.74	23.58	3.27	40.35	15.10

Table No. 2.

Number of Effective Tillers, Number of Earheads Plant-1, Mean Length of Earhead (Cm), Circumference Girth of Earhead (Cm), Weight of Earhead (G Plant-1), Weight of Grains (G Plant-1) and Test Weight (G) As Influenced By Various Fertilizer Treatments

Treatments	No. of effective tillers $plant^{-1}$	No. of earheads $plant^{-1}$	Mean length of earhead (cm)	Mean circumference of earhead (cm)	Weight of earhead (g $plant^{-1}$)	Weight of grains ($gplant^{-1}$)	Test weight (g)
NF	2.20	2.22	16.45	8.04	18.19	13.14	11.24
RDF	3.01	3.00	18.10	9.20	22.53	16.04	12.93
RDF+15k	3.13	3.15	19.80	9.89	23.28	17.21	12.95
RDF+30k	3.63	3.59	21.18	10.73	23.78	17.95	12.99
RDF+45k	3.94	3.93	21.25	10.85	24.09	18.45	13.07
SE(m)±	0.136	0.128	0.312	0.129	0.144	0.208	0.0341
CD (5%)	0.422	0.416	0.952	0.369	0.432	0.661	0.107
GM	3.18	3.18	19.36	9.74	22.62	16.56	12.63

Table No. 3.

Grain Yield, Stover Yield, Biological Yield (Kg Ha-1) And Harvest Index (%) As Influenced By Various Fertilizer Treatments

Treatments	**Grain Yield (kg ha^{-1})**	**Stover Yield (kg ha^{-1})**	**Biological Yield (kg ha^{-1})**	**Harvest Index (%)**
NF	707	1765	2472	28.61
RDF	1281	2883	4164	30.76
RDF+15k	1380	3048	4428	31.16
RDF+30k	1660	3560	5221	31.80
RDF+45k	1690	3591	5282	32.03
SE(m)±	86.3	150.4	185.3	--
CD (5%)	258.9	451.2	555.9	--
GM	1343	2969	4313	30.84

Fig.1.
Grain Yield, Stover Yield and Biological Yield (Kg Ha^{-1}) as Influenced by Various Fertilizer Treatments