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Response of Fodder Millet (*Pennistum Americanum*. L) to Different Levels of Nitrogen and Phosphorus

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Abstract

The experiment was laid out in randomize complete block design with 3 replications. 4 levels of nitrogen (90, 120, 150 and 180 kg ha^{-1}) and three levels of phosphorus (60, 90 and 120 kg ha^{-1}) were applied to each experimental unit. Millet variety "18-BY" was seeded by broad cost method. The result showed that different levels of N and P had significantly affected all measured parameters except numbers of tillers m^{-2}, which were non-significant for P. For N levels higher number of tillers^{-2} (68), plant height (128.7cm), number of leaves plant^{-1}(10), fresh fodder yield (23111 kg ha^{-1}) and dry fodder yield (10611 kg ha^{-1}) was recorded at 180 and 150 kg N ha^{-1} while all these parameters were found lower at 90 kg N ha^{-1}. For P levels, higher plant height (112.8 cm), number of leaves plant^{-1} (10, fresh fodder yield (20555 kg ha^{-1}), and dry fodder yield (10283 kg ha^{-1}) was recorded at 120 kg P ha^{-1}. It was concluded that N at the rate 150 kg ha^{-1} and P at rate of 90 kg ha^{-1} produced higher fresh and dry fodder yield of millet.

Key words: Nitrogen, Phosphorus, Millet, fresh and fodder yield.

INTRODUCTION

Pearl millet (pennistum americanum L) locally called bajra is a tropical coarse cereal belongs to the family of poaceae. In Pakistan it is growing in the sandy desert zone. In Punjab its cultivation is concentrated in the barani areas of Pothwar and the dry region of Bahawalpur. In Sindh the areas knows for millet cultivation are Tharpaker, Hyderabad, Nawabshah and Dadu. In Khyber Pakhtunkhwa it is largely sown in Kohat and D I Khan. It is cultivated in almost all the districts of Baluchistan. During the year 2010 in Pakistan millet was grown 476000 thousand hectares and total production were 293000 thousand tones while in Khyber Pakhtunkhwa the total area under millet was 41000 thousand hectares and total production was 561 kg ha^{-1} [1].Millet has a high nutritional

value as feed for poultry and livestock. Its cultivation in crop rotation has been shown to reduce nematode problems in maize and potato. [2]. Millet grains have high nutritional value beside they are rich source of dietary fiber and hence they are term as nutricereals [3]. The soil and climatic condition of Pakistan are suitable for millet Production but it's per hectare yield is very low. Low yield of millet is due to many constraints but fertilizers application is conceder one of the major factor which can increase fodder production per unit area. Nitrogen play important functions in the plant. It is an essential element of amino acids which is the building blocks of proteins [4]. Nitrogen is also the part of Many plant enzymes thus nitrogen plays a major role in many metabolic reactions of plant. Nitrogen improves the quality of digestible fiber in fodder because it is the structural constituent of cell walls [5, 6]. Nitrogen increase the number of effective tillers, spike length and Stover yield of plant which are desirable characters in fodder. Similarly [7] also obtained significant increase in plant height, leaf length, leaf width, stem diameter, dry matter and crude protein yield. Nitrogen makes fodder more succulent and increase nutritive value of fodder by increasing their protein content [8].Among the essential nutrients phosphorus is one of the most important nutrients for higher yield in larger quantity [9]. Phosphorus improves the rate of reproductive growth in fodder plant [10].

MATERIALS AND METHODS:

To study "the response of fodder millet to different levels of nitrogen and phosphorous" an experiment was laid out in randomize complete block design Phosphorus is the second most crop-limiting nutrient in most of our soils. It is second only to nitrogen in fertilizer use. Plant growth behavior is influenced by the application of phosphorus [11] it is needed for

growth utilization of sugar and starch, photosynthesis, nucleus formation and cell division, fat and albumen formation. Energy from photosynthesis and the metabolism of carbohydrates is stored in phosphate compounds for later use in growth and reproduction [12]. It is readily translocated within the plants moving from older to younger tissues as the plant form cells and develops roots, stems and leaves [13]. Phosphorus results improve growth and improve the quality of vegetative growth. [14]. [13] found positive effect of Phosphorus application on grain yield; whereas [12] stated that Phosphorus application increase dry matter accumulation in plants [10].Keeping in view the importance of nitrogen and phosphorus for enhancing fodder yield. The study was therefore designed to evaluate the effect of different levels of N and P on the fodder yield of millet cultivar "18-BY" under agro climatic condition of Mardan. (RCBD) with three replications. 4 different levels of nitrogen (90, 120, 150 and 180 kg N ha^{-1}) and 3 levels of phosphorus (60, 90 and 120 kg ha^{-1}) was applied to each plot. Urea was used a source of nitrogen and DAP was used as a source of phosphorus. Millet variety "18-BY was sown by broad cost method at the 1st week of July 2012. A plot size 4m x 3m, 25 cm apart was used. Phosphorus was applied at sowing while nitrogen was applied along with irrigation after seedling emergence. All inputs and agronomic practices were carried out uniformly. Five plants were selected random in each plot to record individual observation like plant height, numbers of leaf $plant^{-1}$, leaf area $leaf^{-1}$, and spike length. Number of plant m^{-2} was recorded by thronging 1 m quadrate randomly in to each treatment and the number of plant coming in the range of quadrate were counted. Plant height was taken from the soil level to the top with a meter rod. The numbers of leaves were counted from base to top. Leaf area was recorded.

RESULT AND DISCUSSION:

Number tillers m^{-2}

Nitrogen levels had conquerable affect number of plant m^{-2} and P and NxP was non-significant. Mean values in Table 1 shows that greater number of plant m^{-2} (68) was observed when nitrogen was applied @ 180 kg N ha^{-1} whereas N was applied @ 90 kg ha^{-1} produced lower number of plants m^{-2}(49). While the effect of phosphorus on number of plants m^{-2} was found non-significant. Interaction between nitrogen and phosphorus levels was found non-significant. The possible reason might be that N had increased number of tillers in millet because N enhance vegetative growth in plant while P has least effect on increasing number of tillers in the help of a ruler by taking the length and width of all the leaves of plants from each treatment. And then the value coming from length and width was multiplied with correction factor. Spike length was recorded by measuring the spike length of plants with a ruler. Fresh fodder yield was recorded from the plant coming in the1 meter range of quadrate were weighed in fresh form. Dry fodder yield was recorded from the plant coming in the range of 1 meter quadrate were sun dried and then weighed and averaged were worked out. The data was statistically analyzed according Steel and Torrie principle suitable for our design and LSD test at 0.05 level of probability was used for mean comparison [15].millet. [8] reported that increasing N increase the number of tiller in millet while P have least effect on tillers production.

Plant height (cm)

N and P had significantly affected plant height NxP Interaction was also found significant. The values of the Table 1 revealed that tallest plant (128.7 cm) was measured when N was applied @ 180 kg N ha^{-1}, whereas 120 kg N ha^{-1} resulted short stature plant (99.8 cm). While in case of P the tallest plant (112.8 cm)

was observed when P was applied @ 120 kg ha^{-1}Whereas 60 kg P ha^{-1} resulted shorter plant (95.7 cm). Interaction between N x P showes that application of P at rate of 120 kg ha^{-1} increased plant height (147.7 cm) along with N at 180 kg N ha^{-1}. Increasing plant height with N and p has also been reported by [15] and [17].

Number of leaves $plant^{-1}$

Number of leaves $plant^{-1}$ had significantly affected by N and P levels and their Interaction. Mean value of the Table 1 shows that maximum number of leaves $plant^{-1}$(10) was observed when nitrogen was applied at the rate of 180 kg ha^{-1}, While in case of P the greater number of leaves $plant^{-1}$(10) was recorded when P was applied at the rate of 120 kg ha^{-1} where 60 kg P ha^{-1} produce lower number of leaves $plant^{-1}$(8). N x P showed that application of N and P at rate of 180-120, 150-90,150-120 kg ha^{-1} resulted statistical similar number of leaves (11) respectively. Increasing number of leaves $plant^{-1}$ with N and P has also been reported by [10] and [7].

Fresh fodder yield (kg ha^{-1})

N and P levels and their interaction had significant effect on fresh and dry fodder yield Mean value of the data indicated that higher fresh fodder yield (23111 kg ha^{-1}) was obtained from the plot where N was applied @ 180 kg N ha^{-1} While for phosphorus the higher fresh fodder yield (20555kg ha^{-1}) was obtained when phosphorus was applied @ 120 kg ha^{-1} followed by 90 kg P ha^{-1} with fresh fodder yield (19555 kg ha^{-1}). Interaction between N and P showed that fresh fodder yield was increased with the increase of P along with the increase of N Increasing in fresh fodder yield was due to increase in plant height, number of leaves, spike length and leaf area Increasing fodder yield with N and P has also been reported by [18] and [19].

Dry fodder yield (kg ha^{-1})

N and P levels and N x P had significant effect on dry fodder yield of millet. The final value from table 1 show that greater dry fodder yield (10611 kg ha^{-1}) was obtained when N was applied @ 180 kg N ha^{-1}, whereas 90 kg N ha^{-1}resulted lower dry fodder yield (8777kg ha^{-1}). For P the greater dry fodder yield (10283kg ha^{-1}) was obtained from the plots whereas P was applied @ 120 kg P ha^{-1}, whereas 60 kg P ha^{-1}produce lower dry fodder yield (8916kg ha^{-1}). Interaction between N and P showed that fresh fodder yield was increased with the increase of P along with the increase of N Significant increase in dry fodder yield has also been reported by [16] and [18].

Table 1. Millets tillers m^{-2}, plant height, leaves number, fresh fodder yield and dry fodder yield as affected levels by N and P.

N kg ha^{-1}	number of tillers m^{-2}	plants height (cm)	number of leaves plants $^{-1}$	Fresh fodder yield (kgha^{-1})	Dry fodder Yield (kgha^{-1})
90	49b	92.2d	9b	17333 c	8777 b
120	53b	99.8c	9b	19888 bc	9400 b
150	66a	104b	10a	21000 ab	9844 ab
180	68a	128.7a	10a	23111a	10611a
LSD0.05	10.73	3.65	0.66	2655	1085
P kg ha^{-1}					
	NS				
60		95.7b	8b	18111b	8916 b
	NS				
90		110.1a	10a	19555 ab	9775 ab
	NS				
120		112.8a	10a	20555 a	10283 a
LSD		3.16	0.57	2299	940
N x P	NS	**	**	**	**

****= Significant, NS= non-significant**

Mean values of the same category followed by different letters are significant at p≤ 0.05 level

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