Andhra Pradesh J Agril. Sci : 1(4): 90-93, 2015

YIELD AND ECONOMICS OF DHAINCHA [*Sesbania aculeata* (Wills.) POIR] AS INFLUENCED BY TIME OF SOWING AND PHOSPHORUS FERTILIZATION

C.V. KARUNAKARA REDDY, Y. REDDI RAMU*, G. KRISHNA REDDY, P. SUDHAKAR AND G. PRABHAKARA REDDY

Department of Agronomy, S.V. Agricultural College, Tirupati, Andhra Pradesh – 517 502

ABSTRACT

A field experiment was conducted during *rabi*, 2013 at dryland Farm of S.V Agricultural College, Tirupati, Andhra Pradesh, to identify the optimum sowing time and dose of phosphorus for seed production in Dhaincha. The highest seed yield of Dhaincha was recorded with crop sown during first fortnight of November, which was significantly superior to that of either second fortnight of October or November sowings, while the lowest seed yield was registered with the crop sown during December first fortnight. Application of 45 kg P_2O_5 ha^{-1} has recorded the highest seed yield over the other Phosphorus levels tried. With respect to interaction sowing of Dhaincha during first fortnight of November with application of 45 kg P_2O_5 ha^{-1} has recorded the highest seed yield of Dhaincha, which was significantly superior over the rest of the treatment combinations. The lowest seed yield was recorded with sowing of Dhaincha during first fortnight of December with out application of phosphorus. Dhaincha sown during first fortnight of November, at all the four phosphorous levels recorded the maximum gross returns, net returns and returns per rupee of expenditure over the rest of the sowing dates.

KEYWORDS: Dhaincha, Economics, Phosphorus, Time of sowing, Yield.

INTRODUCTION

India has changed from a reign of food scarcity to food security due to increased fertilizer consumption in the recent past. Per hectare consumption of fertilizer in India has been increased from 95.1 kg ha^{-1} in 1985 to 125.39 kg ha^{-1} in 2014 (Ministry of Agriculture and Co-operation, 2014).

The costs of chemical fertilizers are steadily increasing and are no longer available since they are exhaustible. Off late, escalating prices of inorganic fertilizers on one hand and non availability of sufficient quantity of chemical fertilizers particularly at peak requirement of major crops on other hand had forced the farming community to identify alternate sources of nutrients to meet their nutrient requirements. Dhaincha [*Sesbania aculeata* (Wills.) Poir] is the most important crop for green manuring *insitu* in India due to its ease of establishment, succulency, and accumulation of huge biomass within a short period. The availability of seed in the market depends on its multiplication but, the farmers are perplexed regarding the optimum time of sowing, nutrient management particularly the phosphorus. In contingence of the above the present experiment was carried out to study "Prospects of enhancing the seed yield of Dhaincha [*Sesbania aculeata* (Wills.) Poir] under varied time of sowing and phosphorus fertilization".

MATERIAL AND METHODS

A field experiment was conducted during *rabi*, 2013 at dryland farm of S.V Agricultural College, Tirupati, Andhra Pradesh, to identify the optimum sowing time and dose of phosphorus for seed production in Dhaincha. The experiment was laidout in Randomized Block Design with factorial concept and replicated thrice. The soil of the experimental field was sandy loam, neutral in reaction, low in organic carbon, available nitrogen and phosphorus and medium in available potassium. The treatments comprised of four times of sowing *viz*., S_1 - Second fortnight of October, S_2- First fortnight of November, S_3 - Second fortnight of November and S_4 - First fortnight of December and four levels of phosphorus application *viz.,* P_1 - Control, P_2-15 kg P_2O_5 ha^{-1}, P_3-30 kg P_2O_5 ha^{-1} and P_4- 45 kg P_2O_5 ha^{-1}). Uniform dose of 20 kg N and 30 kg K_2O ha^{-1} through urea and muriate of potash were applied respectively as basal for all the treatments. Phosphorus was applied as per the treatments in the form of single super phosphate at the time of sowing. The seed yields

*Corresponding author, E-mail: ramuagro@rediffmail.com

from each treatment of the net plot were finally recorded. Gross returns were computed considering the prevailing market price of the output. Net returns were arrived by subtracting the cost of cultivation of respective treatments from gross returns for the corresponding treatments. Returns from rupee of expenditure was calculated by using the formula.

Returns from rupee of expenditure =

$$\frac{\text{Net returns (Rs.ha}^{-1})}{\text{Cost of cultivation (Rs.ha}^{-1})}$$

RESULTS AND DISCUSSION

Seed yield

Seed yield of Dhaincha was significantly influenced by time of sowing, phosphorus application and there interaction (Table 1). Seed yield of Dhaincha tend to increase significantly with shifting in sowing from October second fortnight to first fortnight of November and further delay in sowing upto first fortnight of December resulted in significant reduction of the seed yield. The highest seed yield (583 kg ha^{-1}) was recorded with sowing of Dhaincha during first fortnight of November, which was significantly superior to either early or later two sowings. Dhaincha sown during first fortnight of November recorded 39.1, 46.1 and 91 percent higher seed yield over October second fortnight or November and first fortnight of December respectively. Significantly higher seed yield with first fortnight of November over early or delayed sowing dates might be due to partitioning of higher proportion of its total drymatter into the reproductive parts (seed) of the plant. Kumar and Singh (1998) also expressed similar views that higher seed yield with the early sown crop was due to availability of optimum growing conditions which are congenial during the crop. The lower seed yield of Dhaincha recorded during October second fortnight compared to November first fortnight was mainly due to excess rainfall *i.e.* 163 mm of rain received in 9 rainy days immediately after sowing. Excess rainfall during initial stages of the crop growth leading to leaching of nutrients in the light soils, as the present experiment was conducted in the sandy loams. Significantly the lowest seed yield (305 kg ha^{-1}) of Dhaincha was recorded with first fortnight of December. The yield reduction under delayed sowings might be the cumulative effects of lower values of growth and yield components resulted in lower yields. These results are in general agreement with those of Tawaha and Turk (2001), in fababean who indicated that shorter growing period might resulted in lesser drymatter accumulation and fewer pods and branches $plant^{-1}$, owing to reduces seed yield.

Seed yield of Dhaincha was significantly influenced by application of graded levels of phosphorus. The highest seed yield (560 kg ha^{-1}) of Dhaincha was recorded with application of 45 kg P_2O_5 ha^{-1}, with a significant disparity between any two of the four levels of phosphorus tried. The seed yield of Dhaincha was increased by 14.1, 19.8 and 25.3 percent with application of 15, 30 and 45 kg P_2O_5 ha^{-1} over control, 15 kg P_2O_5 and 30 kg P_2O_5 ha^{-1}. This might be due to increased availability of P in during the early stages of the plant growth. Phosphorus increases the carboxylation efficiency and stimulated the ribulose-1, 5-diphosphate corboxylase activity, which in turn resulted in increased photosynthetic rate and thereby owing to higher values of yield attributes *viz.*, pods $plant^{-1}$, seeds pod^{-1}, hundred seed weight and these parameters enhanced the seed yield (Jacob and Lawlor, 1992). Poor available phosphorus (24 kg P_2O_5 ha^{-1}) status of the soil might have a favourable response of Dhaincha to applied phosphorus. The results corroborated with the findings of Turk (1997), Turk and Tawaha (2001) in common vetch.

With respect to interaction, sowing of Dhaincha during first fortnight of November with application of 45 kg P_2O_5 ha^{-1} has recorded the highest seed yield of Dhaincha, which was significantly superior over the rest of the treatment combinations (Table 4.8). Better growth and development of crop in terms of higher growth and yield attributes *viz.*, number of branches $plant^{-1}$, pods $plant^{-1}$, seeds pod^{-1} and hundred seed weight could have reflected in higher seed yield .The lowest seed yield was recorded with sowing of Dhaincha during first fortnight of December with application 0 kg P_2O_5 ha^{-1}(S_4 P_1). Lower seed yield with delayed sowing could also be attributed to the shorter growing period with reduced grain growth duration and non availability of phosphorus, as the available phosphorus present in the experimental field is low (24 kg P_2O_5 ha^{-1}), which may not be sufficient to meet the crop demand. Similar results were reported by Yaragoppa *et al.* (2003) and Ulemale and Shivankar (2003) in different green manure crops.

Economics

Economics is the main bone of contention in making the sound recommendations for adoption of any package

Table 1. Effect of sowing time and phosphorus levels on seed yield (kg ha^{-1}) of Dhaincha

Table 2. Gross returns (Rs. ha^{-1}), net returns (Rs. ha^{-1}) and returns per rupee of expenditure of Dhaincha cultivation as influenced by time of sowing of and phosphorus levels

Treatments	Gross returns (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	Returns per rupee of expenditure
S_1P_1	14805	7339	0.98
S_1P_2	15705	7526	0.92
S_1P_3	20880	11989	1.35
S_1P_4	24075	14471	1.51
S_2P_1	20565	13099	1.75
S_2P_2	22860	14681	1.79
S_2P_3	27765	18874	2.12
S_2P_4	33795	24191	2.52
S_3P_1	14355	6889	0.92
S_3P_2	16650	8471	1.04
S_3P_3	18360	9469	1.07
S_3P_4	22410	12806	1.33
S_4P_1	9180	1714	0.23
S_4P_2	11925	3746	0.46
S_4P_3	13410	4519	0.51
S_4P_4	20475	10871	1.13

Note: Sale price of Dhaincha seed: Rs. 45 kg^{-1}

of practices by farmers. Gross and net returns as well as returns per rupee expenditure were altered to a noticeable extent by time of sowing and phosphorus application (Table 3.). Maximum gross returns were realized with sowing of Dhaincha during the first fortnight of November with application of phosphorus @ 45 kg P2O5 ha-1 (Rs. 33795 ha-1) followed by first fortnight of November sowing with application of phosphorus @ 30 kg P2O5 ha-1 (27765 Rs. ha-1). The same trend was reflected in net return and returns per rupee of expenditure. First fortnight of November contributed to higher seed yield which inturn increased the gross and net returns as well as returns per rupee of expenditure due to increased seed yield. Kumar *et al*. (2005) reported the maximum gross returns, net returns and returns per rupee expenditure with early sowing in sunhemp. Increased benefits of Dhaincha seed crop as regards to gross returns and returns per rupee investment with early sowing were also reported by Kumar *et al.* (2006). Rest of the treatment combinations performed far below returns compared to above treatment combinations. December first fortnight sowing has recorded very low net returns due to lesser seed yield and higher cost of cultivation. These results are in conformity with those of Ulemale and Shivankar (2003) in sunhemp. Dhaincha sown during first fortnight of November, at all the four phosphorous levels recorded the maximum gross returns, net returns and returns per rupee of expenditure over the rest of the sowing dates.

CONCLUSION

It can be concluded that sowing of Dhaincha during first fortnight of November with application of 45 kg P_2O_5 ha^{-1} has resulted in higher seed, stalk yield and harvest index with maximum gross returns, net returns and returns per rupee of expenditure during *rabi* in the Southern Agro Climatic Zone of Andhra Pradesh.

REFERENCES

Jacob, J and Lawlor, D.W. 1992. Dependence of photosynthesis of sunflower and maize leaves on phosphate supply, ribulose 1,5-bisphosphate carboxylase/oxygenase activity and ribulose 1,5-bisphosphate-pool size. *Plant Physiology*. 98:801-807.

Kumar, C.J., Hiremath, S.M., Chittapur, B.M and Chimmad, V.P. 2005. Effect of sowing time and fertiliser levels on seed production of sunhemp in Northern Transitional Zone of Karnataka. *Karnataka Journal of Agricultural Sciences*. 18(3): 594-598.

Kumar, R and Singh, N.P. 1998. Effect of dates of sowing on growth and yield of cowpea (*Vigna unguiculata* (L.) Walp). *Legume Research*. 21(1):54-56.

Kumar, S.K., Singh, R.C and Kadian, V.S. 2006. Response of Dhaincha (*Sesbania aculeata*) genotypes to sowing dates and row spacing. *Indian Journal of Agronomy*. 51(2): 152-153.

Ministry of Agriculture and Co-operation. 2014. *Agricultural Statistics at a Glance*. agricoop.nic.in.

Turk, M.A and Tawaha, A.M. 2001. Common vetch productivity as influenced by rate and method of phosphate placement in Mediterranean environment. *Agiculture Mediteranean.* 131:108-111.

Turk, M.A. 1997. Comparison between common vetch and barley to phosphorus fertilizer application. *Legume Research*. 20:141-147.

Ulemale, R.B and Shivankar, R.S. 2003. Effect of sowing dates, row spacings and phosphate levels on yield and economics of sunhemp. *Legume Research*. 26 (1): 71-72.

Yaragoppa, S.D., Desai, B.K., Halepyati, A.S and Pujari, B.T. 2003. Influence of plant densities and phosphorus management on growth and seed yield of *Sesbania aculeata* (Wills.) Poir. *Karnataka Journal of Agricultural Sciences*. 16 (2): 297- 299.