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SHORT COMMUNCATION

RESPONSE OF PHOSPHORUS ON DIFFERENT COWPEA VARIETIES FOR SEED YIELD PRODUCTION IN SAMBALPUR DISTRICT OF ODISHA

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SUMMARY

Legume fodder plays an important role in dairy farming. Among the different legume fodder crops, forage cowpea is short duration crop having 16-18 percent crude protein content. Fodder cowpea can be grown in kharif as well as in summer season. Demand of fodder cowpea seed is increasing but the availability of quality seed is very low. The seed production of cowpea is a remunerative activity to the farmers. Being a legume crop, it requires more phosphorus for its growth and seed yield. Field experiments were conducted during late *kharif* season of two successive years i.e. 2016 and 2017 to find out the response of phosphorus fertiliser on seed production of three cowpea varieties. Among the three varieties, significantly higher seed yield of 1689 kg/ha was recorded by Bundel Lobia-1 which was followed by EC-4216 with seed yield of 1483 kg/ha. In case of two levels of phosphorus, significantly higher seed yield of 1435 kg/ha recorded by application of 90 kg phosphorus/ ha which was followed by dose of 60 kg phosphorus/ha. Maximum gross monetary return was observed for variety Bundel Lobia-1 with Rs. 136877/ha and application of 90 kg phosphorus /ha with Rs 116262/ha which was followed by variety EC-4216 and dose of 60 kg phosphorus /ha. Similar trends was observed for net monetary return and B:C ratio.

Key words : Forage cowpea, phosphorus, seed yield, economics

Cowpea (*Vigna unguiculata* L.) is an important legume crop widely cultivated for green pods as vegetables and grains purpose. It is also an important legume fodder crop for dairy animals and produces high green forage yield (Arya *et al*., 2019). Cowpea is cultivated as a pure crop or mixed with cereals like maize, sorghum and bajra, so as to enrich their nutritive value due to its higher protein content. Among the various legume fodder crops, Cowpea is important cultivated crop in tropical and subtropical regions of India (Vu *et al*., 2019) and plays an important role in animal diet because it contains 16-17 per cent protein which is more than two times of cereals. Demand of forage cowpea seed is high but availability of quality seed is very low, indicating seed production potential of this crop. The importance of phosphorus application to cowpea has been recognized as it increases nodulation, symbiotic nitrogen fixation, photosynthesis, early flower initiation as well as increasing the number of flowers, seed production, more uniform and earlier crop maturity, increased resistance to plant diseases. Phosphorus is critical to cowpea yield because it is reported to stimulate growth, initiate nodule formation as well as influence the efficiency of the *Rhizobium*-legume symbiosis (Haruna and Aliyu, 2011). Besides phosphorus nutrition, variety or cultivar is also an important factor responsible for yield, which ultimately reflects the economics of the crop. Present study was undertaken to see the effect of different phosphorus levels on seed yield of different fodder cowpea varieties under irrigated conditions.

The field experiments were conducted in Randomized Block Design with six treatments and seven replications during late *kharif* season at State Livestock Breeding Farm, Chiplima Dist. Sambalpur, Odisha where, temperature was ranged from 20^0 - 30^0C and relative humidity initially was above 75% and decreased as season progress. The field study was done in two subsequent years i.e. 2016 and 2017. The treatments included combination of two levels of phosphorus (60 and 90 kg P/ha) and three varieties of fodder cowpea namely EC-4216, UPC-9202 and Bundel Lobia-1. Crop spacing followed was 45 x 15 cm and all remaining management practices were

TABLE 1
Pooled data on response of phosphorus on different cowpea varieties for seed yield and yield attributing characters

Treatment	Number of pods/plant	Pod length (cm)	Seed yield (kg/ha)	1000-seed weight (gm)	Number of grains/pod
Phosphorus kg/ha					
60	14.92	17.62	1309.10	122.14	11.95
90	15.55	17.91	1435.34	128.48	12.0
S. Em±	0.52	0.21	6.01	1.67	0.25
C. D.@0.05%	NS	NS	17.46	4.83	NS
Variety					
EC-4216	15.34	18.02	1483.17	128.50	11.13
UPC-9202	14.39	16.83	943.65	109.71	11.71
Bundel Lobia-1	15.98	18.44	1689.84	137.71	12.29
S. Em±	0.63	0.26	7.37	2.04	0.30
C. D. @0.05%	NS	0.76	21.38	5.93	NS
CV	15.56	5.55	2.01	6.10	9.50

followed as per package of practices. The data on yield traits viz. pod number/plant, pod length, no. of seeds/pod, seed yield/ha and 1000 seed weight were recorded.

The data on the seed yield and yield attributing characters of different varieties of cowpea due to different levels of phosphorus is presented in Table 1. Based on two years data, it was observed that, application of 90 kg phosphorus per hectare gave significantly higher seed yield and 1000 seed weight with 1435.34 kg/ha and 128.48 gm respectively over other treatment. Similar results, i.e. application of higher dose of phosphorus increases yield and yield attributing characters were reported by Jat *et al.* (2013). Suryawanshi *et al*. (2017) also reported that the significant increase in growth, yield, yield parameters and quality in cow pea with increase in the phosphorus levels. Results are in confirmation to those were reported by Nkaa, F.A *et.al* 2014 that the application of phosphorus improved some yield attributes taken into consideration in the study: pod fresh and dry weights, number of pods, length of pods, number of seeds, seed yield and weight of 50 seeds. It is revealed from the Table-1 that, among the three varieties, Bundle Lobia-1 recorded significantly maximum seed yield of 1689.84 kg/ha, 1000 seed weight 137.71 gm and pod length of 18.44 cm. Seed yield is governed by number of factors, which have a direct or indirect impact. Among them are yield components such as number of pods per plant, number of seeds per pod and weight of 100 seed (g). Phosphorus plays an important role in translocation of assimilates to the pods being a constituent of protoplasm, which may be responsible for increased length of pods, number of seeds per pod and in turn seed yield. It was reported by Shilpa *et al.* (2015) that higher number of seeds per pod could be due to increased pod length with higher phosphorus level and it might have accommodated more number of seeds per pod. The significant response of the measured yield characters of cowpea to phosphorus application could be attributed to the role of phosphorus in seed formation

TABLE 2
Pooled data on response of phosphorus on different cowpea varieties on economics

Treatment	Gross monetary returns (Rs/ha)	Net monetary returns (Rs/ha)	B : C ratio
Phosphorus kg/ha			
60	106037	70065	1.95
90	116262	78618	2.09
Variety			
EC-4216	120137	83329	2.26
UPC-9202	76435	39627	1.07
Bundel Lobia-1	136877	100069	2.72

Bundel Lobia-1 variety of fodder cowpea is most suitable for higher seed production with application of 90 kg phosphorus/ha under agro-ecological condition of Sambalpur district of Odisha.

and grain filling. Haruna and Usman (2013) also reported significant increase the seed yield of cowpea with increase in phosphorus level. Application of phosphorus 40kg/ha significantly increased the plant height, leaf area index. Stem girth, number of nodules per plant, number of branches per plant, total dry matter, pod yield also reported by Nadeem *et al*. (2018).

The figures of monitory returns by different treatments are given in Table 2. It is revealed from table that numerically maximum net monetary returns were obtained with application of 90 kg phosphorus per hectare which was Rs. 78618 followed by application of 60 kg phosphorus per hectare in variety Bundel Lobia-1. Similar trends were found to gross monetary returns and benefit cost ratio.

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