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RESEARCH NOTE

Response of chickpea to soil application of cured DAP and foliar nutrition under rainfed condition

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Abstract: A field study on the effect of cured DAP and foliar nutrition on growth and yield of chickpea under rainfed condition during *rabi* 2020 at Regional Agricultural Research Station, Vijayapur, Karnataka revealed higher total dry matter per plant, number of nodules, chlorophyll content and leaf area in treatment DAP cured with vermicompost and foliar spray of 2 per cent DAP which was on par with soil application of DAP cured in FYM and foliar spray of 2 per cent DAP. Similarly, significantly higher number of pods per plant, grain weight per plant, grain yield, haulm yield and economics were recorded with soil application of DAP cured with vermicompost and foliar spray of 2 per cent DAP and it was on par DAP cured in FYM and foliar spray of 2 per cent DAP. Significantly higher net returns and BC ratio were realized in treatment combination of soil application of DAP cured with vermicompost and foliar spray of 2 per cent DAP.

Key words: Chickpea, Foliar nutrition, Growth attributes

India ranks first in area and production in the world, with an area of 10.56 m ha, production of 9.94 m.t and productivity of 1077 kg ha^{-1} (Anon, 2020). Karnataka is one of the major chickpea producing states in the country and ranks fourth in area (8.64 lakh ha) with production of 6.75 lakh tonnes and the average productivity is 782 kg ha^{-1} (Anon, 2020). The productivity of chickpea, however, is low due to inadequate application of nutrients. In chickpea crop, phosphorus has greater role in growth and development. Curing of phosphorus nutrients with organic manures and incubating for one week would help in better release of nutrients and in turn for its better absorption. Similarly, foliar fertilization is an economical way of supplementing the plant nutrients. Henc, the field trial was undertaken to study the effect cured DAP and foliar nutrition on growth and yield of chickpea (cv. JG 11) under rainfed conditions.

Investigation was carried out at Regional Agricultural Research Station (RARS), Vijayapur, Karnataka during *rabi*, 2020 on medium deep black soil (Vertisol) having a soil pH of 8.3 and EC of 0.24 dS/m. The soil was medium in organic carbon (0.5 %), available N (168 kg/ha), P_2O_5 (31 kg/ha), and K (342 kg/ha). There were 15 treatment combinations laid out in randomized complete block design with three replications. The DAP fertilizer was cured with different organics and incubated for one week and applied to soil at the time of sowing. Foliar spray with different nutrients was done at 45 days after sowing. During the experimental year a total rainfall of 867.7 mm was received in 50 rainy days from January to December and which was higher than the normal rainfall. The observations on total dry matter accumulation per plant, leaf area, number of nodules per plant, chlorophyll content, number of pods per plant, grain weight per plant, grain and haulm yield were subjected to statistical analysis

Results revealed that soil application of DAP cured with vermicompost to chickpea recorded significantly higher total dry matter accumulation per plant (15.01 g plant^{-1}) at harvest, leaf area (2.11 dm^2 plant^{-1}) , chlorophyll content at 60 DAS (56.24) (Table 1). Similar findings were reported by Geeta (2014) in soybean.

Similarly, significantly higher number of pods per plant (36.58) at harvest was recorded with soil application of DAP cured with vermicompost (Table 1) probably due to increased availability of P with cured DAP. Higher yields were recorded with soil application of cured DAP with vermicompost and it was on par with DAP cured with FYM (Table 1). The higher grain yield recorded could be attributed to the improvement in number of pods plant^{-1} .Pattar *et al.* (2013) reported an higher yield and yield attributes of chickpea with treatment of DAP cured with FYM.

Further, foliar feeding of 2 per cent DAP recorded significantly higher total dry matter accumulation (14.65 g plant^{-1} at harvest, leaf area (2.10 dm^2), and chlorophyll content (55.65) at 60 DAS is probably due to the better availability of nutrients. Similar, observations were made by Pathak *et al.* (2012) and Ganga *et al.* (2014) in chickpea and Krishna and Kaleeswari (2018) in pigeonpea. Number of pods plant^{-1} (35.71) followed similar trend (Table 1). Consequently, foliar feeding of 2 per cent DAP recorded significantly higher grain yield (1865 kg ha^{-1}) and haulm yield (2606 kg ha^{-1}), while foliar feeding of 1 per cent 19:19:19 was on par (Table 2). These findings were in line with the findings of Velayutham (2016) in blackgram.

Among the interaction treatments, the dry matter (15.51 g plant^{-1}) accumulation and distribution was significantly higher with soil feeding of DAP cured in vermicompost and foliar spray of 2 per cent DAP(Table1) Further,significantly higher grain yield (2,040 kg ha^{-1}) and haulm yields (2,882 kg ha^{-1}) were recorded with soil application of DAP cured with vermicompost (Table 1) and foliar feeding of 2 per cent DAP owing to higher number of pods plant^{-1} (38.77) (9.54 g). Soil application of DAP cured with vermicompost recorded significantly higher gross (Rs.84084 ha^{-1}) and net returns (₹ 57772 ha^{-1}) due to the higher grain yield. The treatment

Table 1. Growth parameters, yield attributes and economics of chickpea as influenced by application of cured DAP and foliar nutrition.

Treatments	TDM (g plant^{-1}) at harvest	Chlorophyll content at 60 DAS (SPAD values)	Leaf area (dm^2) at 60 DAS	Number of pods plant^{-1}	Grain yield (kgha^{-1})	Haulm yield (kg ha^{-1})	Gross returns (₹ ha^{-1})	Net returns (₹ ha^{-1})	BC ratio
Factor I : Curing with ogranics (M)									
M_1 : DAP cured with FYM (1:10)1	14.24	54.85	2.05	35.37	1754	2474	80421	54406	2.98
M_2: DAP cured with vermicompost (1:10)	15.01	56.24	2.11	36.58	1812	2638	84084	57772	3.18
M_3: Control (DAP without curing)	12.71	49.52	1.78	29.70	1536	2234	68421	42209	2.23
S.Em ±	0.13	0.65	0.04	0.41	20	38	1062	1049	0.04
C.D. (p=0.05)	0.39	1.88	0.12	1.19	59	111	3076	3040	0.12
Factor II: Foliar spray (S)									
S_1: 2 % urea spray	13.88	52.51	1.93	33.58	1620	2418	75226	48880	2.69
S_2: 2 % DAP spray	14.53	55.65	2.10	35.71	1865	2606	83620	55935	3.14
S_3 : 1 % KNO_3 spray3	13.94	53.42	1.97	33.78	1680	2458	77296	51850	2.82
S_4: 1 % 19:19:19 spray	14.18	54.27	2.04	34.05	1730	2472	78635	52889	2.98
S_5 : Control (No spray)	13.42	51.84	1.85	32.31	1607	2290	73436	47757	2.34
S.Em ±	0.17	0.84	0.05	0.53	26	49	1371	1355	0.05
C.D. (p=0.05)	0.50	2.42	0.15	1.54	76	143	3972	3925	0.16
Interaction									
M_1S_1	14.87	53.8	2.08	35.4	1609	2226	76085	51073	2.82
M_1S_2	15.41	56.9	2.25	36.9	1909	2705	84908	57878	3.22
M_1S_3	14.73	54.1	2.10	35.3	1770	2549	80754	55742	3.14
M_1S_4	15.31	56.0	2.07	35.7	1834	2585	82652	56640	3.11
M_1S_5	14.81	53.5	2.02	33.6	1648	2308	77710	50698	2.59
M_2S_1	14.18	56.1	1.96	35.7	1746	2767	81362	54350	3.01
M_2S_2	15.08	57.7	2.12	38.8	2040	2882	93678	64666	3.53
M_2S_3	14.35	55.8	2.03	36.3	1740	2570	81106	55794	3.14
M_2S_4	14.37	56.3	2.18	36.8	1789	2634	83000	57788	3.14
M_2S_5	13.21	55.3	1.94	35.3	1745	2341	81276	56264	3.10
M_3S_1	12.60	47.6	1.74	29.7	1505	2262	68231	41219	2.23
M_3S_2	13.09	52.4	1.93	31.5	1647	2233	72275	45263	2.68
M_3S_3	12.75	50.4	1.78	29.7	1531	2256	70028	44016	2.19
M_3S_4	12.88	50.5	1.86	29.7	1569	2198	70253	44241	2.70
M_3S_5	12.25	46.7	1.59	28.0	1428	2220	61322	36310	1.34
S.Em. ±	0.30	1.45	0.09	0.92	45	85	2374	2347	0.09
C.D. (p=0.05)	0.86	NS	NS	2.67	132	248	6879	6799	0.27

also recorded significantly higher B:C ratio (3.18). Among foliar nutrition, significantly higher net returns (₹ 55,935 ha^{-1}) and benefit cost ratio (3.14) was obtained with foliar spray of 2 per cent DAP (Table 1). Increase in net returns with foliar nutrition were reported by Ramesh *et al.* (2016) in blackgram and Vighnesh *et al.*(2021) in cowpea. While, soil application of DAP cured with vermicompost and foliar spray of 2 per cent DAP together recorded significantly higher net returns (₹ 64,666 ha^{-1}) and benefit cost ratio (3.53).

Hence, based on the results it was concluded that chickpea crop nutritionally nourished with soil application of recommended phosphorus through DAP cured in vermicompost along with foliar feeding with 2 per cent DAP helped in getting higher grain yield and realising higher net returns under rainfed condition.

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