

Effect of seed pelleting with diammonium phosphate and potassium dihydrogen phosphate and foliar spray with diammonium phosphate on growth and yield of rainfed cowpea (*Vigna unguiculata*)

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ABSTRACT

An experiment was conducted during 1995 and 1996 to study the influence of seed pelleting with diammonium phosphate (DAP) and potassium dihydrogen phosphate (KH_2PO_4) in comparison with DAP spray in rainfed 'Paiyur 1' cowpea [*Vigna unguiculata* (L.) Walp.] under North-Western Agroclimatic Zone of Tamil Nadu. Soil application of recommended inorganic fertilizers (RIF) + 2% DAP spray twice (first at flowering and second at 15 days after first spray) showed the highest plant height. Branches and pods/plant, seeds/pod, 100-seed weight, dry-matter production, seed yield, net income and benefit : cost ratio. Seed pelleting with DAP and KH_2PO_4 did not influence the above-said parameters appreciably.

Key words : Foliar spray, Seed pelleting, DAP, KH_2PO_4 , Rainfed cowpea

Pulses are known to respond for soil application of fertilizer (N and P), both under rainfed and irrigated conditions. Spraying of 2% diammonium phosphate (DAP) is a proven technology for irrigated pulses in achieving higher seed yield (Tomar *et al.*, 1987; Arunachalam *et al.*, 1995). In rainfed pulses it is yet to be tested. Seed pelleting of pulses with DAP is yet another technology recommended for higher pulse yield. Potassium dihydrogen phosphate (KH_2PO_4) is another P source for seed pelleting. Information on the effect of seed pelleting with DAP and KH_2PO_4 in rainfed pulse is scanty. An attempt was

therefore made to study the effect of seed pelleting on pulse yield in comparison with DAP spray and soil application of recommended inorganic fertilizers.

MATERIALS AND METHODS

The field experiment was conducted during the rainy season of 1995 and 1996 in the rainfed condition at Regional Research Station, Paiyur, under red soil condition of North-Western Agroclimatic Zone of Tamil Nadu. The soil of experimental site was loamy sand with a pH 8.2 and electrical conductivity 0.14 dS/m. The experiment was laid out in randomized block design

with 4 replications. The treatments included were : T₁, 2% DAP spray twice (first at flowering and second at 15 days after first spraying); T₂, seed pelleting with DAP; T₃, soil application of recommended inorganic fertilizers (RIF); T₄, seed pelleting with KH₂PO₄; T₅, RIF + 2% DAP spray twice (T₃ + T₁); and T₆, control. Water spray was not given to the plots which were not treated by DAP spray. 'Paiyur 1' cowpea was sown at a spacing of 30 cm × 15 cm. The treatments were imposed as per schedule. For spraying DAP 2% solution 6 kg DAP was sprayed in 300 litres water. Similarly, quantity of chemicals used for seed pelleting were DAP 300 g/kg seed and KH₂PO₄ 268 g/kg seed respectively. The quantity of DAP and KH₂PO₄ for seed pelleting was worked out, based on the quantity of DAP used for foliar spray. The recommended inorganic fertilizer dose used was 12.5 : 25 : 0 N : P : K kg/ha. Plant height, branches/plant, pods/plant, seeds/pod, 100-seed weight and seed yield were recorded. The dry-matter production was

also recorded. Net income and Benefit : Cost ratio were calculated accordingly.

RESULTS AND DISCUSSION

Growth characters

There was significant variation in plant height and branches/plant among the treatments (Table 1). Cowpea crop receiving RIF + 2% DAP twice attained maximum plant height and branches/plant and the treatment was significantly superior to all the treatments. The next best in the order was RIF application. Significantly lowest plant height and branches/plant were recorded in the control.

Yield attributes

Pods/plant, seeds/pod and 100-seed weight differed significantly due to treatments. Pooled data showed that the RIF + 2% DAP spray resulted in the highest pods/plant, seeds/pod and 100-seed weight, followed by RIF alone. Significantly lowest yield attributes were recorded with the control. Seed pelleting

Table 1. Growth and yield attributes of cowpea as influenced by seed pelleting with DAP and KH₂PO₄ in comparison with DAP spray (mean data of 2 years)

Treatment	Plant height at harvest (cm)	Branches/plant	Pods/plant	Seeds/pod	100-seed weight (g)
T ₁ , 2% DAP spray twice	63.1	4.5	15.1	10.0	8.5
T ₂ , seed pelleting with DAP	60.2	4.1	13.2	9.9	8.2
T ₃ , recommended inorganic fertilizers (RIF)	72.3	5.2	18.1	10.8	8.9
T ₄ , seed pelleting with KH ₂ PO ₄	55.2	3.5	13.4	9.4	8.0
T ₅ , RIF + 2% DAP spray twice (T ₃ + T ₁)	78.5	5.6	20.7	12.1	9.8
T ₆ , control	50.4	3.1	11.0	9.1	7.1
CD (P = 0.05)	5.8	0.3	1.7	0.7	0.4

with DAP and KH_2PO_4 did not influence the yield attributes appreciably. Similar results were recorded in pigeonpea by Yellamanda Reddy *et al.* (1987).

Seed yield and dry-matter production

Seed yield (Table 2) of cowpea was significantly influenced by the treatments studied during both the seasons. The highest seed yield was recorded in RIF + 2% DAP spray twice (T_5) and it was significantly different with that obtained in rest of the treatments. The effect of seed pelleting with DAP (T_2) or with KH_2PO_4 (T_4) did not show appreciable influence on seed yield. The lowest mean seed yield was recorded in the control. The yield increase due to 2% DAP spray over RIF application was 18.9%. Similarly, Srivastava and Srivastava (1987), Soliappan and Ramiah (1990) and Arunachalam *et al.* (1995) also reported the advantage of DAP in redgram. Dry-matter production (Table 2) of cowpea

showed similar trend as that of seed yield.

Economics

The data on mean net income of cowpea for two years were calculated and presented in Table 2. The highest net income was realized from the treatment of RIF + 2% DAP spray twice (T_5), followed by RIF application alone. The treatment of 2% DAP twice (T_1) gave the net income of Rs 1,901/ha. Seed pelleting with DAP (T_2) and KH_2PO_4 (T_4) did not influence the net income much. In the control (T_6) there was heavy loss and the values were negative. The increased seed yield obtained in the treatments T_5 , T_3 and T_1 resulted in realizing the net income positively.

Similar to that of net income the mean benefit : cost ratio was influenced positively by the treatments of T_5 , T_3 and T_1 in the descending order and was 1.96, 1.75 and 1.75, respectively. The treatment of seed pelleting with DAP and KH_2PO_4 showed

Table 2. Yield and economics of cowpea as influenced by treatments

Treatment	Seed yield (kg/ha)			DMP (kg/ha)			Net income (Rs/ha) (Pooled)	Benefit : cost ratio (Pooled)
	1995	1996	Pooled	1995	1996	Pooled		
T_1 , 2% DAP spray twice	854	872	863	2,234	2,161	2,198	1,901	1.75
T_2 , seed pelleting with DAP	488	584	536	1,314	1,460	1,387	451	1.16
T_3 , recommended inorganic fertilizers (RIF)	915	922	954	2,385	2,456	2,421	2,546	1.75
T_4 , seed pelleting with KH_2PO_4	461	465	463	1,125	1,175	1,150	-26	0.99
T_5 , RIF + 2% DAP spray twice (T_3 + T_1)	1,010	1,258	1,134	2,480	3,144	2,818	3,471	1.96
T_6 , control	197	312	255	732	790	761	-1,292	0.55
CD (P=0.05)	162	68	82	328	223	111	NA	NA

Cost: Cowpea seed, Rs 6/kg; dry matter, Rs 100/tonne; DAP, Rs 7.42/kg
NA, Data statistically not analysed

lower values of benefit : cost ratio and it was the lowest in the control. It can be concluded that RIF + 2% DAP significantly increased the; growth and yield attributes, seed yield and net income which in turn resulted in increased benefit : cost ratio.

In dryland situation it could be recommended that soil application of recommended inorganic fertilizers + 2% DAP spray twice recorded higher seed yield and net income. Seed pelleting either with DAP or with KH_2PO_4 did not influence the yield appreciably.

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