

Effect of GA and Ethanol (Arrack) on Growth and Yield of Pigeon Pea

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Abstract

A field experiment was carried out to assess the effect of ethanol and GA and their combination spray on yield of pigeon pea during *Kharif* of 2005 and 2006. Significant increase in plant height was recorded with GA 40 ppm spray over control which was at par with GA 20 ppm and GA combination with alcohol spray. However, data on seed yield revealed the significant increase in the seed yield with ethanol 5%, followed ethanol 10% and ethanol 5% + GA-20 ppm spray over control. Increase in the yield with 5% ethanol spray may be attributed to increase in 100 seeds weight, pods per plant, seed yield per plant, branches per plant and stem girth.

Key words : Ethanol, GA, Pigeon pea, Seed yield.

The short chained alcohols like ethanol and methanol are reported to enhance the total biomass accumulation in several C_3 plants (1), but their mechanism of action as plant growth regulators is not well understood. However, it is believed that there will be increase in CO_2 concentration, serine biosynthesis in leaves and reduced photorespiration causing transient modification in carbon assimilation and improvement in water use efficiency. This would enhance the over all productivity in C_3 plants. Pigeon pea (*Cajanus cajan* (L) Mill sp.) is an important commercial grain legume crop in the northern Karnataka. Gulbarga is one of the important pigeon pea growing area in Karnataka occupying on area of 55.7% and producing 34% of total production in the state. Hence, Gulbarga is popularly known as dhal bowl of Karnataka. But the productivity in this region is 344 kg/ha which is much lower than state (485 kg/ha average). This crop being a C_3 in nature and its yield largely depends on total biomass and its production. The reports on stimulatory effect of foliar application of alcohols and GA in pigeon pea is meager. In view of this an investigation was carried out to assess the effect foliar spray of alcohol (ethanol) and GA on yield in pigeon pea.

Methods

A field experiment was carried out in Agricultural Research Station, Bheemarayangudi during

kharif of 2005 and 2006 using the pigeon pea cultivar Maruthi (ICPL 8863). The trial was laid out in randomized block design with three replications consisting of nine treatments including water spray and control. Arrack sprayed at two concentration levels i. e. 5 and 10%, GA was also sprayed at two concentration levels i.e. 20 and 30 ppm. The combination treatment of two levels of arrack with GA 30 ppm was studied. Arrack was sprayed at 50% flowering and GA was sprayed at flower initiation stage of the crop. The locally available arrack is a source of ethanol which contains 40% and was used for the experiment.

Results and Discussion

Data on seed yield revealed the significant in-

Table 1. Effect of arrack and GA spray on ancillary parameters in pigeon pea.

Treatments	Plant height (cm)	Plant girth (cm)	Primary branches per plant	Secondary branches per plant
T ₁ Arrack-5%	165.5	5.17	13.3	48.3
T ₂ Arrack-10%	168.0	4.43	13.8	52.3
T ₃ GA-20 ppm	188.9	4.57	13.2	50.7
T ₄ 40-ppm	193.3	4.87	14.5	56.0
T ₅ (T ₁ + T ₃)	174.0	5.07	14.2	58.3
T ₆ (T ₁ + T ₄)	182.0	5.47	13.8	55.7
T ₇ (T ₂ + T ₃)	187.6	4.67	14.0	50.0
T ₈ Water pray	175.2	4.87	12.2	45.3
T ₉ Control	165.8	4.17	12.5	43.0
SE	2.6	0.33	0.42	2.8
CD at 5%	7.3	NS	1.2	8.5

Table 2. Effect of arrack and GA spray on yield and yield parameters in pigeon pea.

Treat-ments	No. of pods per plant	Test weight (g/100 seeds)	Seed yield g/pl	Seed yield kg/ha
T ₁ Arrack 5%	254	8.90	120.3	1371.3
T ₂ Arrack 10%	252	8.78	121.3	1370.2
T ₃ GA 20 ppm	203	8.21	113.7	1229.9
T ₄ 40 ppm	214	8.20	112.7	1285.7
T ₅ (T ₁ + T ₃)	245	8.18	116.0	1225.6
T ₆ (T ₁ + T ₄)	258	8.61	116.3	1345.2
T ₇ (T ₂ + T ₃)	229	8.03	114.3	1243.2
T ₈ Water pray	225	7.43	109.3	1175.3
T ₉ Control	212	7.74	101.3	942.9
SE	8.0	0.15	2.01	39
CD at 5%	24	0.44	6.03	117

crease in the seed yield with arrack 5% followed arrack 10% and arrack 5% + GA 20 ppm spray over control. Increase in the yield with arrack 5% spray may be attributed to increase in 100 seeds weight, pods per plant and seed yield per plant. Thus it proves the speculation that alcohol decreases the photorespiration and improves the carbon assimilation efficiency (2). It is evident from the results that increases the treatment the branches per plant. Similarly improvement in the vegetative growth and yield in cotton, soybean, tomato and wheat and other crops have been reported (1—4).

Significant increase in plant height was recorded with GA 40 ppm spray over control which was at par with GA 20 ppm and GA combination with alcohol spray (Table 1). Since GA translocation occurred mainly through the simplast an increase in hypocotyl length and in the length of the nodes, affected the height of plants, not thickness of the plant as evident from the results; where as there was decreased stem thickness with GA spray. Similar results are reported by Bora and Sharma (5) in soybean. Results are in agreement with the findings of Nanomura and Benson (1), Who reported an increase in plant height in lettuce with GA spray.

References

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