Environment & Ecology 29 (2A) : 903—904, 2011
 ISSN 0970-0420

Influence of Foliar Spray of Seed Hardening Chemicals on Growth and Yield of Chickpea (*Cicer arietinum* L.)

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Abstract

A field experiment was conducted during *rabi* of 2009 to study the effect of foliar spray of seed hardening chemicals on morpho-physiological traits and yield in chickpea (*Cicer arietinum* L.) . Significantly higher seed yield was recorded with KNO_3 1% spray (1,630.2 kg/ha) as compared to control (1,136.0 kg/ha). The increased seed yield in KNO_3 1% spray may be attributed to increase in the yield attributing traits like pods per plant, pod weight per plant, seed yield per plant and 100 seeds weight, total dry matter accumulation. There was no effect of KNO_3 spray on plant height and branches per plant.
Key words : Chickpea, Salicylic acid, KNO_3, $CaCl_2$, Lihosin.

Chickpea (*Cicer arietinum* L.) is a major *rabi* season pulse crop in southern peninsular India. It is generally grown on conserved moisture and moisture in the soil profile gradually recedes as the crop grows. As a consequence, plant experiences progressively increasing degree of terminal moisture stress. Thus soil moisture stress assuming a major limiting factor for determining the growth and yield of chickpea. Therefore there is a need to identify suitable ameliorative measurers to overcome the moisture stress effect.The pre-sowing seed hardening with chemicals is one of the simple techniques being employed to modify the marpho-physio-bio chemical nature of seed, so as to induce the characters that are favorable for drought resistance. But effect of foliar spray of seed hardening chemicals for induction of drought tolerance in chickpea are meager. Keeping these inview the investigation was under taken to study the effect of seed hardening chemicals spray on growth and yield in chickpea.

Methods

A field experiment was conducted during rabi of 2009 at college of Agriculture farm Bheemrayangudi, under rain fed conditions. The trial was laid out in randomized block design with three replications. There were nine treatments including one control without any spray and one water spray. Seed hardening chemicals used as a foliar spray are lihosin at two concentrations $CaCl_2$ with two concentrations salicylic acid with two concentrations and KNO_3 at one concentrations. Anngeri-I cultivar was used and the treatments were imposed at 50% flowering stage of the crop. The plant height was recorded from base of the plant to tip of the main stem. Number of branches per plant, total dry matter and its distribution in leaf stem and reproductive parts, pods per plant, 100 seeds weight, seed yield per plant were worked out from the tagged five plants and average was computed.

Results and Discussion

Significantly higher seed yield was recorded with

Table 1. Effect of hardening Chemicals on growth parameters in chick pea.

Treatments (%)	Plant height (cm)	No. of branchs plant	Dry weight vegetative parts (g/plant)	Total dry matter (g/plant)
T_1 Lihosin 0.05	31.3	4.2	26.7	46.90
T_2 Lihosin 0.1	31.5	3.6	26.74	46.34
T_3 $CaCl_2$ 0.5	31.1	3.4	23.4	42.54
T_4 $CaCl_2$ 1	31.3	3.5	31.0	50.74
T_5 KNO_3 1	33.9	4.0	39.4	65.0
T_6 Salicylic acid 0.05	32.8	3.9	27.34	46.86
T_7 Salicylic acid 0.1	32.0	3.4	30.4	55.14
T_8 Water spray	30.3	4.3	23.8	43.4
T_9 Control	31.2	3.1	26.0	49.0
SE ±	1.0	0.4	1.68	2.38
CD at 0.05	NS	NS	6.02	7.12

Table 2. Effect of hardening chemicals on yield and yield parameters in chickpea.

Treatments (%)	No. of pods g/plant	Pod weight g/plant	Seed weight g/plant	Test weight (g/100 seeds)	Harvest index (%)	Yield (kg/ha)
T_1 Lihosin 0.05	70.5	19.6	17.14	22	36.1	1269.3
T_2 Lihosin 0.1	71.8	19.6	18.14	22	39.2	1358.3
T_3 $CaCl_2$ 0.5	74.2	19.0	16.14	22.3	37.9	1220.4
T_4 $CaCl_2$ 1	82.8	19.74	19.86	22.7	39.6	1279.8
T_5 KNO_3 1	84.4	22.0	20.8	24	38.0	1630.2
T_6 Salicylic acid 0.05	66.0	19.54	17.54	22.7	37.7	1260.0
T_7 Salicylic acid 0.1	89.2	25.6	23.86	22.3	36.6	1351.0
T_8 Water spray	65.2	19.6	17.14	21	39.3	1112.0
T_9 Control	65.7	23.14	19.06	20.7	39.1	1136.0
SE ±	5.37	1.22	1.23	0.85	2.23	66.7
CD at 0.05	16.1	3.63	3.66	NS	NS	191.0

KNO_3 1% spray (1,630.2 kg/ha) as compared to control (1,136.0 kg/ha). There was also significant improvement in the yield attributes like pods per plant, pod weight per plant, seed yield per plant and 100 seeds weight,due to KNO_3 spray. Thus it indicates that spray of KNO_3 1% supplied N and K which are effectively absorbed as anion and cation by plants, and might have delayed the senescence of leaves promoted cytokinin activity, causing higher chlorophyll retention. This may secure higher photosynthetic activity in effective leaves and supplied developing pods with current photosynthates for proper filling and finally resulting in higher yield. Besides the beneficial functions of nitrate nitrogen, the prevalence of K + in KNO_3, might have improved grain filling and phytomass production, due to increasing photosynthetic actitvity and effective translocation of as similates to reproductive parts resulting in higher yield. The results are in agreement with the findings of (1) in grass bean, who reported improvement in yield and yield attributes to KNO_3 spray. On the other hand, There was numerical effect of various seed hardening chemicals spray on plant height and branches per plant (Table 1). The insignificant effect on vegetative growth may be due imposition of treatments after surpassing the vegetative growth phase. However, there was significant increase in total dry matter accumilation (TDM) and its partition into seeds (HI) and in vegetative sink due to KNO_3 1% spray as compared to control. This might be attributed to hastened availability of N in the plant system, more chlorophyll synthesis, greater accumulation of protein in plants and efficient translocation of assimilates to reproductive parts. Similarly (2) reported greater assimilation of photosynthesis due to KNO_3 spray when plants are under stress.

References

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