J. Indian bot. Soc. 63 : 244—246, 1984

EFFECTS OF CHEMICAL REPLENISHMENT OF SEEDS OF *CICER ARIETINUM* G130 ON SUBSEQUENT PLANT VIGOUR[1]

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ABSTRACT

Vigour of *Cicer arietinum* G130 plants from older seeds was found lower than the vigour of those from younger seeds. Partial chemical replenishment through pretreatment with GA_3 and KCl brought partial to complete recovery in the vigour of plants from older seeds.

INTRODUCTION

Several workers (Ruge, 1947; Zeleny, 1954; Sircar and Biswas, 1960; Sircar, 1970; Roberts *et al.* 1973; Osborne *et al.*, 1974; Abdel-Magid and Osman, 1975; Shamshery and Banerji, 1979) have observed reduction in the levels of various biochemical components including growth regulators, in seeds during storage, accompanying loss of viability. Hence, it was of interest to attempt retardation of such loss by replenishments through pretreatment of seeds with different chemicals. In this paper effects of gibberellic acid (GA_3) and potassium chloride (KCl) in inducing partial to complete recovery in the vigour of plants from older seeds as compared to the vigour of those from younger seeds is reported.

MATERIALS AND METHODS

Seeds of *Cicer arietinum* G130 stored for 3 months and for 15 months respectively after harvest were used. Both seed lots were harvested from plants grown in the experimental plots of the University Botanical Garden, and were stored in the laboratory in polythene bottles at room temperature (ca 28± 5°C). About 100 healthy seeds of uniform colour and size of the older seed lot were selected, surface sterilized with 0.1% $HgCl_2$ and soaked in, 200 ml, 100 mg/l gibberellic acid (GA_3) and potassium chloride (KCl) for 4h. . The seeds were then air dried and were sown in the field. Older seeds soaked in distilled water for 4h, constituted the control set for treated seeds. Seeds of younger seed lot, selected as above were also soaked in distilled water for 4h and were air dried before sowing for comparison. To assess plant vigour of different sets growth parameters such as, shoot and root fresh and dry weight, leaf number nodule number and pod number per plant, were recorded at 25, 50 and 70 days from emergence. The results as given in Table 1, are averages of 20 samples. Standard deviation (S. D.) has been calculated for each parameter.

RESULTS AND DISCUSSION

The data show that vigour of plants grown from older seed-lot at most of the

1. Accepted for publication on March 7, 1983.

Thanks are due to Professor Y. S. Murty for constant encouragement and help, to UGC for JRF and to Dr. D. Banerji for helpful suggestions.

TABLE I

EFFECTS OF 100 MG/1 GA_3 AND 100 MG/ KCl PRETREATMENTS TO FRESHLY HARVESTED AND 15 MONTH STORED *CICER ARIETINUM* G130 SEEDLOTS ON PLANT VIGOUR AT DIFFERENT AGES AFTER EMERGENCE

Parameter	on day 25				on day 50				on day 70			
	Younger seedlot	Older seedlot			Younger seedlot	Older seedlot			Younger seedlot	Older seedlot		
		Control	GA_3	KCl		Control	GA_3	KCl		Control	GA_3	KCl
Root wt (gfw/plant) (—nodule) ±S.D.	1.49 ±0.07	0.99 ±0.08 a**	1.18 ±0.08 b**	1.72 ±0.03 b**	2.63 ±0.09	1.88 ±0.05 a**	1.73 ±0.12 b**	3.25 ±0.03 b**	2.65 ±0.05	1.88 ±0.07 a**	1.47 ±0.06 b**	2.90 ±0.08 b**
Root Wt (gdw/Plant) (—nodule) ±S.D.	0.12 ±0.01	0.08 ±0.00 a**	0.09 ±0.01 b**	0.13 ±0.02 b**	0.27 ±0.01	0.18 ±0.01 a**	0.19 ±0.02 b**	0.31 ±0.06 b**	0.30 ±0.02	0.25 ±0.06 a**	0.10 ±0.04 b**	0.35 ±0.02 b**
Nodules/plant ±S.D.	6.0 ±1.82	8.00 ±1.76 a**	7.00 ±1.67 b**	8.00 ±1.78	28.00 ±2.08	20.00 ±1.15 a**	25.00 ±2.22 b**	35.00 ±1.98 b**	+	+	+	+
Shoot Wt (gfw/plant) ±S.D.	0.65 ±0.05	0.45 ±0.07 a**	0.49 ±0.06 b**	0.61 ±0.04 b**	1.93 ±0.08	1.21 ±0.06 a**	1.48 ±0.08 b**	1.60 ±0.09 b**	3.38 ±0.06	2.05 ±0.08 a**	2.82 ±0.08 b**	2.90 ±0.05 b**
Shoot wt (gdw/plant) ±S.D.	0.15 ±0.02	0.06 ±0.00 a**	0.07 ±0.00	0.09 ±0.02 b**	0.41 ±0.04	0.41 ±0.06	0.42 ±0.02	0.48 ±0.04 b**	1.75 ±0.07	0.90 ±0.08 a**	1.73 ±0.07 b**	1.89 ±0.03 b**
Leaf/plant ±S.D.	17.00 ±1.96	12.00 ±1.00 a**	13.00 ±1.00 b**	17.00 ±2.40 b**	36.00 ±4.00	27.00 ±4.00 a**	29.00 ±3.00 b**	38.00 ±2.12 b**		+	+	+
Pods/plant ±S.D.	+	+	+	+	+	+			9.00 ±1.78	6.00 ±1.28 a**	6.00 ±1.00	9.00 ±1.29 b**

Symbols : *significant at 5% level of significance, **—at 1% level, a—significance test between old and young control seedlot sets, b—significance test between old control and treated seedlot sets, +—organs absent.

stages is lower than the vigour of those from the younger seed-lot (Table I). Chemical replenishment through pre-treatment of seeds with GA_3 induced some recovery, but pre-treatment with KCl induced greater recovery, e.g. the root growth of plants from older seed-lot at all stages was ca 30% less than that of those from younger seed-lot. KCl induced complete recovery both in terms of fresh and dry weight, and even induced, some promotion over control. GA_3 treatment was ineffective, and in some cases was even inhibitory. Nodulation also declined with seed ageing. At 50 days after emergence the nodule number of plants from older seed lot was ca. 30% less than in plants from younger seed-lot. GA_3 induced partial recovery, whereas KCl not only caused complete recovery, but also caused promotion (Table I). However, the average fresh weight of each nodule was nearly same in all the set (0.011 g). The fresh shoot weight of plants obtained from older seed-lot was ca 30 to 40% less than those obtained from younger seed-lot. However, KCl pretreatment in all stages induced significant recovery which ranged from 30 to 40% over control in plants from older seed-lot and ca 80 to 90% in plants from younger seed-lot. GA_3 also induced partial recovery in the last stage, although, the extent of recovery was less than that of KCl. In terms of shoot dry weight even complete recovery at the last stage could be observed. A complete recovery in number of leaves formed, subsequent to KCl treatment, at 25 and 50 days was observed.

The effects on vegetative growth were also reflected in number of pods formed. The ca 30% decline in the number of pods formed in plants from older seeds was counteracted completely with KCl pretreatment (Table I).

Tsinkov (1971), Mierzwinska (1975), Narasimhareddy and Swamy (1977) and Saxena and Maheshwari (1979) reported that exogenous application of chemicals can improve performance of aged seeds. Further experiments are necessary to explain the differential effects of GA_3 and KCl.

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