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 Madras Agric. J., 79 (1) : 9-11 January, 1992

35940360 (308)

EFFECT OF CYTOZYME ON SEED GERMINATION, EARLY SEEDLING GROWTH AND CHLOROPLAST PIGMENTS CONTENT IN CERTAIN PULSE CROPS*

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MISSING PAGE 100 35940360 ABSTRACT

While the lower concentrations of cytozyme promoted seed germination, seedling growth, fresh and dry weights and chloroplast pigments content in pigeonpea, cowpea and soybean, the higher concentrations inhibited seed germination as well as seedling growth. Cytozyme if applied at a concentration of 2 ml/ as a seed soaking medium might improve both seed germination as well as seedling growth in pulse crops to the maximum extent.

KEY WORDS : Cytozyme, Pulses, Germination, Growth, Chloroplast.

Cytozyme is a biochemically active stimulant containing cytokinin, auxin, amino acids and chelated micronutrients. External application of cytozyme would increase the plant height due to increased rate of photosynthesis, accelerated translocation and efficient utilization of photosynthates resulting in cell division and cell elongation in the growing parts (Hooda et al., 1983). Cytozyme constitutes micro nutrients (Copper 0.06% Iron 0.22% manganese 0.15%, zinc 0.20% etc.),

enzymes (diastase, maltase, invertase cellulase, insulase etc.) and hormone (cytokinin and auxin) (Singh et al., 1978^s in isolate, Cytozyme seed plus and cytozyme crop. plus spray have been reported to be beneficial effect on the growth and yield of several field crops and vegetables (potato (Pandita and Hooda, 1978), groundnut (Singh et al., 1978) and radish (Pandita et al., 1981). In this context, present investigation is taken up and effect of different concentrations

ing growth.	Total amount
	0.27
	0.28
	0.34
	0.30
	0.28
	0.23
	0.22

Table 1. Effect of different concentrations of cytozyme on seed germination, seedling growth and chloroplast pigments content in *Cajanus cajan* (L.) Mill sp. var. Co.5 (Pigeonpea)

Concentration (ml/l)	Seed germination percentage	Length of root in cm.	Length of shoot in cm.	Number of lateral roots formed	Fresh weight in gμ	Dry weight in gμ	Chloro phyll a (μg/g fr. wt.)	Chloro phyll b (μg/g fr.wt)	Total Chloro phyll c (μg/g fr.wt)	Total amount of carotenoids (μg/g fr.wt)
Control	100	11.42	15.07	25	0.405	0.047	347.66	660.60	1008.26	0.28
1.	100	14.50	15.15	29	0.423	0.051	354.98	701.72	1056.70	0.29
2.	100	14.60	16.20	35	0.483	0.057	407.72	769.92	1177.64	0.32
3.	96	14.19	15.00	20	0.404	0.049	337.65	642.38	980.03	0.29
4.	92	8.50	6.75	12	0.350	0.047	327.64	624.16	951.80	0.26
5.	76	5.24	6.07	7	0.332	0.045	317.63	605.94	923.57	0.25
5.	62	4.15	5.21	4	0.326	0.044	297.61	569.50	867.11	0.24

Denotes the significant difference from control at P = 0.05 level
 Denotes the significant difference from control at P = 0.01 level.

cytozyme on seed germination, seedling growth and chloroplast pigments content of Co. 5 pigeonpea, Co.3 cowpea and Co.1 soybean has been studied and the results reported.

MATERIALS AND METHODS

The seeds of *Cajanus cajan* (L.) Millsp. var. Co.5 (Pigeonpea), *Vigna unguiculata* (L.) Walp. var. Co. 3 (cowpea) and *Glycine max* (L.) Merr. var. Co. 1 (soybean) were procured from Tamil Nadu Agricultural University; Goimbatore. Selected healthy seeds were divided into batches of 25 each. The batches of seeds were soaked in different concentrations of the cytozyme seed plus (+) viz., 1 ml, 2 ml, 3 ml, 4 ml, 5 ml and 6 ml/l. One batch of seeds was kept as control by soaking them in distilled water. After 24 h. of soaking the solutions were decanted, washed repeatedly with distilled water and the seeds were allowed to germinate for 7 days in water and the seeds were allowed to germinate for 7 days on germination towels. On the day of termination of the experiment (7th day), the seed germination percentage and seedling growth parameters viz., the length of the primary root, the length of the epicotyl and hypocotyl/shoot and the number of lateral

roots formed were recorded. The average fresh weight of all the seedlings, control as well as experimental samples were recorded. The seedlings were dried in an electric oven at 80°C for 24 h. and the average dry weight was calculated. The average values of duplicate experiments were tabulated. Employing the 't' test, the significant differences of the seedling growth parameters including fresh and dry weights were statistically evaluated at $p = 0.05$ and 0.01 levels.

The contents of chlorophyll a, chlorophyll b and total chlorophylls in 80% acetone extracts were calculated following the formula of Arnon (1949). Total carotenoids were extracted and estimated following the method of Mahadevan and Sridhar (1982).

RESULTS AND DISCUSSION

The results obtained with *Cajanus cajan* Millsp. var. Co.5, *Vigna unguiculata* (L.) Walp. var. Co.3 and *Glycine max* (L.) Merr. var. Co.1 are presented in Tables 1, 2 and 3 respectively. The lower concentrations of cytozyme (1 ml and 2 ml/l) promoted not only seed germination but also seedling growth including fresh and dry weights

Table 2. Effect of different concentrations of cytozyme on seed germination, seedling growth and chloroplast pigments content in *Vigna unguiculata* (L.) walp sp. var. Co.3 (cowpea)

Concentration (ml/l)	Seed germination percentage	Length of root in cm.	Length of epicotyl in cm.	Length of hypocotyl in cm.	Number of lateral roots	Fresh weight in gms.	Dry weight in gms.	Chlorophyll a (ug/gm fr.wt)	Chlorophyll b (ug/gm fr.wt)	Total Chlorophylls (ug/gm fr.wt)	Total amount of carotenoids (mgs/gm fr.wt)
Control	84	8.63	10.08	6.41	16	0.744	0.046	277.59	533.06	810.65	0.24
1	84	10.81	13.28	6.48	18	0.767	0.047	327.64	624.16	951.18	0.26
2	88	12.79	14.75	8.02	20	0.775	0.049	347.66	660.60	1008.26	0.28
3	76	12.10	13.79	7.90	18	0.688	0.041	323.01	628.84	951.85	0.25
4	76	9.44	13.13	6.72	16	0.677	0.040	313.00	541.92	854.92	0.24
5	68	8.74	10.32	5.24	13	0.672	0.038	252.94	432.60	685.54	0.23
6	68	8.46	10.08	5.12	11	0.618	0.037	207.52	405.52	613.04	0.22

Denotes the significant difference from control at $P = 0.05$ level

Denotes the significant difference from control at $P = 0.01$ level.

Table 3. Effect of different concentrations of cytozyme on seed germination, seedling growth chloroplast pigments content in *Glycine max* (L.) Merr. var. Co.1 (soybean)

Concentration (ml/l)	Seed germination percentage	Length of root in cm.	Length of epicotyl in cm.	Length of hypocotyl in cm.	Number of lateral roots	Fresh weight in gμ.	Dry weight in gμ.	Chloro phyll a (μg/gμ. fr.wt)	Chloro phyll b (μg/gμ. fr.wt)	Total Chloro phylls (μg/gμ. fr.wt)	Total amount of carotenoids (mgμ./gμ. fr.wt)
Control	64	9.94	1.62	7.13	17	0.499	0.061	327.64	624.16	951.80	0.27
1	68	11.61	1.64	8.15	21	0.572	0.072	347.66	660.60	1008.26	0.28
2	72	12.38	3.74	11.01	28	0.664	0.076	379.63	733.48	1113.11	0.34
3	64	10.73	1.82	8.39	21	0.585	0.063	357.67	678.82	1036.49	0.30
4	52	9.22	1.53	7.93	17	0.542	0.062	332.25	651.74	983.99	0.28
5	48	7.27	0.81	7.14	13	0.481	0.042	274.90	555.96	830.86	0.23
6	40	4.56	0.80	5.60	9	0.475	0.040	254.88	519.52	774.40	0.22

* Denotes the significant difference from control at P = 0.05 level
 ** Denotes the significant difference from control at P = 0.01 level.

These two concentrations also increased chloroplast pigments content in all the three pulse crop studied. Similar observations have been made earlier in sugar beet (Ryan *et al.*, 1982) and okra (Pandita *et al.*, 1983). Cytozyme stimulated seedling growth has been attributed to the presence of cytokinin, auxin, amino acids and chelated micro nutrients. In general, relatively higher concentrations of cytozyme inhibited seed germination, suppressed seedling growth and prevented accumulation of chloroplast pigments in all the three pulse crops investigated.

The results of the present investigation revealed that cytozyme if applied at a concentration of 2 ml/l as a seed soaking medium might improve both seed germination as well as seedling growth in pulse crops to the maximum extent.

ACKNOWLEDGEMENT

The authors are thankful to Dr.K.K. Lakshmanan, Professor and Head of Botany Department for facilities provided.

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