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EFFECTS OF GA_3 AND THIOUREA ON PROTEIN, PEROXIDASE ACTIVITY AND CHLOROPHYLL STATUS IN SEEDLINGS OF ANOLA

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ABSTRACT

The experiment was conducted in the laboratories of the Department of Horticulture, G.A.U., Anand during 1993. Three concentration each of GA_3 and thiourea, distilled water and control (total 8 treatments) were given to the seeds of Anola with 36 h. of subsequent soaking and drying thrice. Observations were recorded 6, 8 and 10 week intervals on protein peroxidase specific activity and chlorophyll content. GA_3 500 ppm was effective in increasing the protein content of leaves and stem whereas no treatment was effective in enhancing the peroxidase specific activity in leaves, stems and roots. GA_3 250 ppm was again helpful in increasing the total chlorophyll content of the leaves at all the three intervals.

KEY WORDS : Anola, seedling, protein, peroxidase activity, chlorophyll

Anola (*Phyllanthus emblica* Linn.) is one of most important fruit crops of the tropics and subtropics and broadly cultivated for its fruits rich in vitamin c and commercially exploited for hair dyes, medicine, ink etc. (Ram, 1983). Till recently, the main emphasis has been given on the yield and fruit preservation and very little on improvement in seed germination in anola raised for rootstocks. The phenomenon of seed germination is associated with changes in several protein constituents. Proteins are broken down during germination with a concomitant rise in amino acids and amides followed by de novo synthesis of protein and enzymes in the germinating parts of embryo. Peroxidases widely distributed in plants and peroxidase activity is related to cell growth and differentiation. The aim of the present investigation was to find out the possible role of protein and peroxidase enzyme for altering seed germination.

MATERIALS AND METHODS

Present investigations were carried out at the Department of Horticulture, Gujarat Agricultural University, Anand Campus during 1993 in completely randomised design with four replications and eight treatment *viz.*, three concentrations each of GA_3 and Thiourea (250, 500 and 750 ppm), distilled water and control (untreated). Pre-sowing treatments of seed soaking and subsequent drying processes were carried out for 36 hr followed by a surface sterilisation with 0.2 percent mercuric chloride. Treated seeds were allowed to germinate in pots and for chemical analysis samples were taken at 6 weeks (Ist stage), 8 weeks (IInd stage) and 10 weeks (IIIrd stage) interval. Protein percentage peroxidase specific activity (Change in O.D/hr./mg. protein) in leaves, stem, leaves and roots and chlorophyll content (mg/g fresh weight) were determined by employing normal methods.

Table 1. Effect of GA_3 and thiourea on protein content (%) at different stages in *anola* seedling

Treatments	Leaves			Stem			Roots		
	Stages			Stages			Stages		
	Ist	IInd	IIIrd	Ist	IInd	IIIrd	Ist	IInd	IIIrd
Control	15.43	12.15	10.17	7.00	9.22	8.70	7.74	8.50	11.46
Distilled water	17.15	15.26	12.26	8.75	10.17	8.90	8.74	9.88	10.40
GA_3 250ppm	25.20	24.37	22.36	17.50	21.30	19.70	18.65	20.10	21.94
GA_3 500ppm	26.60	25.40	24.50	16.24	20.15	18.55	17.54	21.20	22.08
GA_3 750ppm	21.70	19.80	13.00	16.00	19.70	15.67	14.26	17.00	19.60
Thiourea 250ppm	24.52	22.93	18.82	14.35	15.26	12.88	15.00	17.80	18.60
Thiourea 500ppm	25.20	24.60	22.64	15.00	16.58	15.50	16.67	20.18	21.80
Thiourea 750ppm	23.00	21.92	15.05	14.00	15.40	10.08	16.00	19.20	20.00

RESULTS AND DISCUSSION

Protein content

Leaf protein content (Table 1) decreased with advancement in period of germination. Maximum protein content was recorded with GA_3 500 ppm at all three stages while it was minimum in control. The influence of GA_3 on enzymes of carbohydrate, protein and nucleic acid metabolism has been explained by Key (1969). The protein in stem was found highest at second stage under all treatments. The level of protein in roots increased as germination period advanced. It appears that increase in enzyme activity which is associated with protein synthesis resulted in protein level changes in the plants. The decrease in leaf protein at third stage may be due to utilisation of protein in growth and development processes of plant.

Peroxidase specific activity

It is evident (Table 2) that control recorded the highest peroxidase activity in leaves at all three stages. Under thiourea treatments 750 ppm gave highest activity and increase in GA_3 level upto 750 ppm increases the activity at all three stages. Similarly, in stems, control registered the highest at first and third stages whereas, at second stage, distilled water treatment was better over rest of the treatments. The peroxidase activity in roots increased with advances in period of germination. At all three stages control and GA_3 supported maximum and minimum peroxidase activity respectively.

In general, different concentrations of GA_3 and thiourea decreased the enzyme activity in leaves, stem and roots. The presence of peroxidase in seeds resulted into relatively high activity of interaction in plant metabolism which might destroy and cause imbalance in the growth regulator proportions, which results in poor and late germination (Rao, 1975). The findings are in conformity with the result of Chetal and Nainawatee (1976).

Total chlorophyll

The treatments showed a remarkable difference among the treatments on total chlorophyll content (Table 3) in leaves. The chlorophyll level increased with advancement in the crop growth. The maximum level was recorded

Table 2. Effect of GA_3 and thiourea on specific peroxidase activity at different stages of *anola* seedlings (change in O.D./hr./mg protein)

Treatments	Leaves			Stem			Roots		
	Stages			Stages			Stages		
	Ist	IInd	IIIrd	Ist	IInd	IIIrd	Ist	IInd	IIIrd
Control	0.665	2.754	2.562	4.208	2.672	3.024	0.858	11.285	15.778
Distilled water	0.604	2.238	1.422	3.757	3.103	2.178	0.740	9.945	13.622
GA_3 250ppm	0.138	1.470	0.210	2.576	0.262	0.582	0.184	1.412	7.986
GA_3 500ppm	0.258	1.925	1.326	1.418	0.354	1.464	0.480	5.257	10.848
GA_3 750ppm	0.264	1.854	1.002	1.719	0.603	0.948	0.162	2.168	6.386
Thiourea 250ppm	0.397	1.134	0.342	0.984	1.762	0.714	0.288	2.727	11.252
Thiourea 500ppm	0.356	1.158	0.720	1.600	1.969	1.620	0.195	3.856	15.906
Thiourea 750ppm	0.406	1.853	1.188	0.754	1.996	1.578	0.186	6.000	15.906

Table 3. Effect of GA_3 and thiourea on total chlorophyll content in leaves of *anola* seedling (mg/g fresh weight)

Treatments	Stages		
	Ist	IInd	IIIrd
Control	0.441	1.074	1.436
Distilled water	0.450	1.047	1.484
GA_3 250ppm	0.750	1.568	1.755
GA_3 500ppm	0.712	1.456	1.701
GA_3 750ppm	0.691	1.541	1.622
Thiourea 250ppm	0.685	1.392	1.586
Thiourea 500ppm	0.664	1.371	1.532
Thiourea 750ppm	0.627	1.293	1.584

with GA_3 250 ppm at all three stages and minimum level under distilled water at stage second and control at stage first and third. Similar variation in chlorophyll status was also reported by Shinde *et al.* (1989).

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SOIL FERTILITY CAPABILITY CLASSIFICATION OF PROBLEM SOILS OF TIRUNELVELI, TUTICORIN AND KANYAKUMARI DISTRICTS OF TAMIL NADU

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ABSTRACT

Surface and sub surface soil samples pertaining to 7, 9 and 4 soil sub groups in Tirunelveli, Tuticorin and Kanyakumari districts respectively were studied during July - September 1994 for the assessment of fertility level and the preparation of the soil fertility capability classification. The main condition modifiers selected were 'e', 'k', 'b', 's', 'h', 'n' and 'g' for Tirunelveli district and 'e', 'k', 'b', 's', 'v', 'h', 'g' and 'n' for Tuticorin district and 'h', 'e', 'g', 'b' and 'k' for Kanyakumari district. All the soils of three districts are low in available nitrogen and hence in addition to the above modifiers, the low available N status was also considered to be the local modifier.

KEY WORDS : Fertility capability classification, problem soils, soil fertility.

The soil fertility capability classification (FCC) system was designed to group soils having similar limitations of fertility management (Buol, 1972). It provides a guide for the extrapolation of the fertilizer response experience. Among the various approaches in providing information on the potential of the soil for crop production, soil fertility capability classification is one which lays emphasis on the components of soil fertility within 50 cm layers from the surface. An attempt has been made to use this concept for the problem soils of three southern districts of Tamil Nadu *viz.*, Tirunelveli, Tuticorin and Kanyakumari.

MATERIALS AND METHODS

Seven representative sites of problem soils in Tirunelveli, nine in Tuticorin and four in Kanyakumari districts were selected during July - September, '94 for this purpose. Samples were collected from upper 20cm or plough layer whichever was shallower. Subsoil samples within 50 cm of the surface were collected depending on