Table 3. Efficacy of antagonists mass multiplied in undecomposed coirpith against egg plant wilt disease (artificial inoculation).

Treatments	Wilt incidence (%)			Mean
	15 DAT	30 DAT	45 DAT	
T. hamatum (isolate 1)	26.67 (31.05)	40.00 (39.23)	56.67 (48.81)	41.11 (39.70)
T. viride (isolate 1)	31.67 (34.19)	46.67 (43.80)	70.00 (56.80)	49.45 (44.93)
T. harzianum (isolate 1)	66.67 (37.24)	51.67 (45.93)	75.00 (60.11)	54.55 (47.76)
Commercial product of *T. viride*	31.67 (34.19)	50.00 (44.97)	70.00 (56.80)	50.56 (45.32)
Coirpith (undecomposed)	48.34 (44.01)	63.34 (52.74)	78.33 (62.30)	63.34 (53.02)
Control	58.33 (49.81)	75.00 (60.11)	88.33 (70.49)	73.89 (60.14)
Mean	38.89 (38.42)	54.45 (47.80)	73.06 (59.22)	
	CD (P=0.05)			
Treatments	2.23			
Days	1.58			
Treatments x Days	3.86			

* Mean of four replications Values in parentheses are transformed values. DAT : Days after transplanting.

REFERENCES

GAUR, A.C., NEELAKANTAN, S. and DARGAN, K.S.(1984) **Organic Manures.** Indian Council of Agricultural Research, New Delhi, 159 pp.

HADAR, Y., CHET, I. and HENIS, Y. (1979) .Biological control of *Rhizoctonia solani* damping off with wheat bran culture of of *Trichoderma harzianum.* **Phytopathology 69** : 64-68.

KOUSALYA, G. and JEYARAJAN, R. (1988) Techniques for mass multiplication of *Trichoderma viride* Pers. Fr. and *T.harzianum* Rifai. **Abstracts of Papers Presented in National Seminar on Management of Crop Diseases with Plant Products/Biological Agents,** 10-12 January, 1988. Agricultural College and Research Insititue, Madurai, India, pp.32-33.

NELSON, E.B., KUTER, G.A. and HOITINK, H.A.J. (1983) Effects of fungal antagonists and compost age on suppression of *Rhizoctonia* damping-off in container media amended with composed hardwood bark. **Phytopathology 73:** 1457-1462.

WRIGHT, J.M. (1956) Bilogical control of a soil borne *Pythium* infection by seed inoculation. **Plant Soil 9:** 132-140

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INFLUENCE OF LIGHT AND REGULATORS ON SENESCENCE RELATED CHANGES IN DETACHED SOYBEAN LEAVES *Glycine max*

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ABSTRACT

The rate of senescence and the soluble protein profile from the detached soybean leaf senescing either in darkness or light was analysed and compared to those of leaves in which senescence was delayed by application of cytokinin, IAA or enhanced through the action of abscisic acid. Senescence of detached leaf in light differed significantly from senescence in darkness. The chlorophyll and protein were lost at a higher rate in darkness than light. Changes observed during incubation in light or darkness appeared to be related to the condition rather than the rate or progress of senescence. Incubation with IAA delayed senescence only moderately as compared to BA. Cytokinins delayed and ABA accelerated the changes in soluble protein profile compared to water.

KEY WORDS : Soybean, Leaves, Senescence, Light, Regulators, Influence

Leaf senescence in pulse is influenced both by internal and external factors. Senescence is accelerated moderately when the detached leaves are kept in light bit strongly in darkness. Growth regulators play a major role in the senescence process. Among the growth regulators, cytokinins are effective in delaying senescence, whereas abscisis acid enhances senescence (Varga and Bruinsma, 1973).

During senescence of detached leaves, most of the photosynthetic membrane and enzyme proteins synthesis reduced drastically than senescence of attached leaf (Thomas and stoddart, 1980). It will be of interest to investigate the content of photosynthetic pigments, total proteins and soluble protein profile in senescing detached leaves. Using SDS-PAGE the soluble protein patterns of detached soybean leaves senescing either in darkness or light were analysed and compared to those of leaves in which senescence was delayed or accelerated by application of cytokinin, IAA and BA.

MATERIALS AND METHODS

The seedlings of soybean *(Glycine max.L.)* CV.CO.11 were grown in a glass house. From eight day old plants, the first leaves were sampled and incubated in sterile water or different regulator solutions. The cytokinin (BA), auxin (IAA) and abscisic acid (ABA) were used at concentrations of 10 uM, 10uM, and 100 uM, respectively. Samples were taken after 7 days of incubation under various conditions for further analysis.

For each analysis the distal protein of the leaves were extracted with 1.5 ml extraction buffer (100 mM Tris Hcl, 10mM EDTA, 10mM 2-mercaptoethanol, 100mM NaCl and o.1% ascorbic acid, p^H 7.8) by grinding in a mortar with a pestle at 4^0C. The homogenate was centrifuged and the protein in the resulting supernatant extracted with phenol, precipitated with acetone, centrifuged and finally extracted with diethyl ether. The powdery pellets were recovered for SDS-PAGE gel electrophoresis as per Laemmli (1970). The coomassie blue stained protein profiles were scanned by using Beckman CU 640 spectrophotometer with a special gel scan apparatus. the content of soluble and total proteins (Bradford, 1976) and Chlorophyll was determined. (Aron, 1949).

RESULTS AND DISCUSSION

The differences between the various conditions are reflected by the incubation times required for 50 per cent loss are protein and chlorophy (Table 1). This incubation time was delayed by hight and BA. Under both light and dark conditions, ABA increased the rate of senescence as evidence from the observed 50 per cent loss within five to six days.

The photosynthetic pigments degradation was quite obvious in detached leaf incubated with ABA followed by IAA and water (Table 2). The influence of BA in retarding senescence was conspiquous interms of more amount of chlorophyll and protein retention under both light and dark conditions as compared to initial amounts. While the loss pigment and protein was 42 and 34 per cent respectively in water, it was only 15 and 7 per cent in BA. Under darkness the rate of degradation of pigment and protein was still higher than respectively light treatment in all incubation conditions. Incubation with IAA under-both light and dark conditions did not prevent the loss of chlorophyll and protein effectively and the senescence process was well pronounced in dark than light. Under ABA the rate of destruction of chlorophyll and protein was fast, where a loss of about 70 and 63 per cent respectively of chlorophyll and protein was observed after 7 days of incubation (Table 2).

Table 1. Incubation time (days) on solutions required for 50% loss of chlorophyll and protains from leaf samples (Average from 3 Independent experiments).

Incubation solution	Light (400 UE $m^{-2}S^{-1}$)		Darkness	
	Chlorophyll	Protein	Chlorophyll	Protein
Water	8	10	7	8
BA (10 µm)	13	14	11	13
IAA (10 µm)	10	8	7	8
ABA (100 µm)	5	6	5	6

Table 2. Changes in chlorophyll and protein content in detachest leaf of 8 days old plant incubated in different solutions for 7 days.

Normal pracment	Light condition	Total chlorophyl l conteent mg.g F.N.	Total protein content mg. g^{-1} F.d.
Prior to incubation (control)	-	1.99 (0)	36.5 (0)
Detached Leaf	L	1.15 (42)	24.0 (34)
	D	1.01 (50)	21.0 (42)
Detached leaf in BA	L	1.70 (15)	34.0 (7)
	D	1.37 (31)	33.7 (8)
Detached leaf in IAA	L	1.29 (50)	18.5 (49)
	D	1.00 (70)	21.0 (43)
Detached leaf in ABA	L	0.60 (70)	17.5 (52)
	D	0.59 (71)	17.2 (53)
		±0.46	±7.75

L : Light (400 μ E m^{-2} S^{-1}); D : Dark
(Figures in parentheses indicate per cent reduction over values prior to incubation)

Changes in membrane permeability and increased activity of lipid peroxidase was found to be the cause for rapid loss of chlorophyll and protein. In darkness, chlorophyll and protein were more readily lost as compared to light indicating synthesis of specific mRNAs and subsequent translation process are light regulated (Thompson and White, 1991). It has been reported that the extensive changes observed during the incubation period under darkness were found to be reversed to certain extent upon return of leaf incubated under light (Malik, 1987).

The growth regulators mediated alteration senescence process is obvious (Table 2, 3). In the present study, BA prevented the senescence effectively through the sustained metabolic state of photosynthetes and their distribution in leaf (Thomas and Stoddart, 1980).

The spectrophotometric scan data obtained for the protein profile of the SDS-PAGE system (Table 3) indicated a major loss in polypeptides of Rubisco sub-units (55 and 15 k Da) and other cytosolic protein in the molecular range of 34, 33, 32, 28 and k Da during senescence of detached leaves. However, incubation with BA showed complete protection of the above proteins from degradation under both light and dark conditions. The degree of protection from degradation was more in light than dar. Cytokinins in detached leaves inhibited the turn over of senescence promoting enzymes thereby it protects major proteins against the degradative process (Verga and Bruinsma, 1973). After incubation with IAA under both light and dark conditions, the above polypeptides were found degraded but the polypeptides level in the molecular range of 55, 15 and 28 were protected than those leaves incubated in water. Auxins like IAA and NAA have been reported to reduce the rate of senescence in leaf sections through high specificity and affinity with auxin binding sites in membranes and have an interaction with protein synthetic apparatus (De Leo an Sacher, 1970). Incubation of detached leaves with ABA resulted in total degradation of soluble proteins. However, certain specific proteins .(26,32 and 33 k Da) were retained under dark condition. It has been reported that ABA increase acid proteases formation in light but perhaps decreases it in darkness. Zhi-yi*et al* 1988).

Table 3. Spectrophotometric scan data of Specific protains resolved in SOS-PAGE system (Values in per cent area of protein profile)

Treatment	Light (L) / Dark (D)	Proteins in kfloialtons				
		55	32-33	28	26	15
Before incubation		27.0	8.5	5.5	4.2	11.0
Water	L	16.0	6.1	3.6	2.8	7.0
	D	12.5	5.7	3.1	2.0	5.8
BA	L	23.5	7.8	5.0	4.0	9.5
	D	20.4	7.5	4.8	3.5	9.2
IAA	L	17.4	6.4	4.0	3.0	7.8
	D	14.8	6.1	3.8	2.4	7.6
ABA	L	4.0	1.0	0.6	0.5	2.0
	D	5.6	2.5	1.8	1.7	2.6

REFERENCES

ARNON, D.I. (1949) Copper enzymes in isolated chloroplasts. Polyphenol oxidase in *Beta vulgaris*. **Plant Physiol. 24:** 1-15.

BRADFORD, M.M (1976) A rapid and sensitive method for the quantitation of microgram quantities of protein utilising the principle of protein - dye binding. **Anal. Biochem., 72** 248-254.

DE LEO ,P.and SACHER, J.A. (1970) Control of ribonuclease and acid phosphatese by auxin and abscisic acid during senescence in Anoka soybeans. **Am.J.Bot.65**: 205-213.

LAEMMLI, U.K. (1970) Cleavage of structural proteins during the assembly of the head of the bacteriophage T 4. **Nature 227**: 680- 685.

MALIK, N.S.A. (1987) Senescence in Oat leaves. Changes i translatable mRNAs **Physiol Plant., 70**: 438 - 446.

THOMAS, H. and STODDART, J.I. (1980). Leaf senescence **Ann.Rev.Plant Physiol., 31**: 83-111.

THOMPSON, W.F. and WHITE, M.J.(1991). Physiological an molecular studies of light regulated nuclear genes in highe plants. **Ann.Rev.Plant Physiol. Plant Mol.Biol., 42** 423-466.

VARGA, A. and BRUINSMA, J. (1973) Effects of differen cytokinins on senescence of detached leaves. **Planta 111** 91-93.

ZHI-YI, T., VEIERSKOR, B., PARK, J. and THIMANN, K.V (1988) Multiple actions of abscisic acid in senescence o Oat leaves. **J.Plant Growth Regul.,7:** 213-226.

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INFLUENCE OF DIFFERENT HOSTS ON THE ADULTS OF *Trichogramma chilonis*

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ABSTRACT

The influence of different hosts on the biology of adults of *Trichogramma chilonis* (Ishii) was tested in the laboratory. *T.chilonis* showed highest preference for the eggs of *Pthorimoea operculella* as shown by highest parasitisation (76.2%), adult emergence (96.33%) females (55.31%) and longevity (6.4 days)

KEY WORDS : Hosts, Influence, *Trichogramma*, Biology

The Trichogrammatids are exclusively egg parasitoids, primarily of Lepidoptera. The biology and vigour of *Trichogramma* is highly influenced by the host of the parasitoid (Navarajan Paul *et al.*, 1981). Hence, the present study was undertaken to find out the influence of different hosts on *T.chilonis*.

MATERIALS AND METHODS

Adults of *T.chilonis* were bred on *Corcyra cephalonica* (Staintion) which were mass multiplied on *cumbu* grains in jars (11x 37.5 cm) following the method of Navarajan Paul (1973). The host *Pthorimoea operculella* (Zeller) was mass multiplied based on the method developed by Platner and Oatman (1968) and *Helicoverpa armigera* (hubner) was bred on a semi-synthetic diet (Rabindra and Dhandapani , 1988). *Spodoptera litura* (Boisduval) was bred on castor leaves Ignoffo (1965).

The eggs of *C.cephalonica, P.operculella, H.armigera* and *S.litura* were uniformaly mounted seperately on a card (6 x 2 cm) at the rate of 100 eggs with gum. The eggs of *P.operculella* and *H.armigera* laid on cloths (by mass culture) were seperated using 0.05 per cent sodium hypochlorite. The eggs of *S.litura* were seperated from the egg masses using a brush and then pasted on the cards. Five cards of each host eggs were prepared and got parasitised on exposure in two pairs of *T.chilonis* in a test tube for 24 h. The parasitised eggs were separated and placed in small glass vials for adult emergence. The parasitoids were provided with 50 per cent honey solution as food on a small piece of cloth inside the test tube. The open ends of the test tubes and vials were plugged with surgical cotton. The adults in the vials on emergence were maintained until they died to observe adult longevity. The experiment was conducted at 27+-1^0 c and 70 +- 5 per cent relative humidity. Observations on parasitic efficiency, emergence, longevity and development period were recorded.