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CERTAIN PHYSIOLOGICAL CHANGES IN GREENGRAM PLANTS INFECTED BY MUNGBEAN YELLOW MOSAIC VIRUS

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Infection of greengram plants by mungbean yellow mosaic virus (MYMV) caused significant reduction in number of pods per plant, seed yield and 100-seed weight. When healthy and infected leaves were compared a reduction in the contents of chlorophyll and functional chloroplast cells was evident in infected leaves. Soluble N and reducing sugars accumulated to a greater extent in infected than in healthy leaves. Photosynthetic rate was reduced in infected leaves in comparison with healthy ones.

Greengram (*Vigna radiata* (L.) Wilzeck is an important dryland pulse crop in South India and especially in Tamil Nadu. Mungbean yellow mosaic virus (MYMV) causes severe plant damage and reduction in yield in this crop (Nariani, 1960). The leaves of the infected plants show different grades of yellowing with reduced photosynthetic efficiency (Hopkins and Hampton, 1969). The present paper reports on certain physiological changes in greengram plants infected by MYMV.

MATERIAL AND METHODS

Healthy and MYMV infected plants were collected from an experimental field of Tamil Nadu Agricultural University, Coimbatore during Monsoon 1983, which had severe incidence of MYMV. The variety chosen was Co 4. Fully expanded top most leaves of 42-day old plants (Kuo *et al*, 1977) were used in various estimations. The leaves were graded into five categories viz., healthy, mildly infected, moderately infected, severely infected and very severely infected based on severity of infection (Nene, 1973). Total chlorophyll content was estimated as per Yoshida *et al.*, (1971). Photosynthetic rate was measured using Infra Red carbon dioxide Gas Analyser (IRGA). Chloroplast cells were extracted following the procedure of Jenson and Bassham (1966) and their absorption spectrum was determined. Soluble nitrogen and reducing sugar contents were estimated as described by Humphries (1956) and Somogyi (1952) respectively.

RESULTS AND DISCUSSION

Chlorophyl content :

Total chlorophyll content remained low in the MYMV infected leaves and the decrease is proportional to the severity of infection (Table 1). Mishra and Jha (1967) reported similar results in chilli leaves infected by mosaic virus. Singh and Suhag (1982) noticed greater reduction in both chlorophyll 'a' and 'b' contents in MYMV infected greengram leaves. The reduction in pigment contents was found to be proportional with severity of infection in the case of rice necrosis mosaic virus (Ghosh, 1982).

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Table 1. Photosynthetic rate (mg CO_2 m^{d-2} hr^{-1}), Chlorophyll, Soluble nitrogen and reducing sugar (mg/g) contents in healthy and MYMV infected greengram leaves.

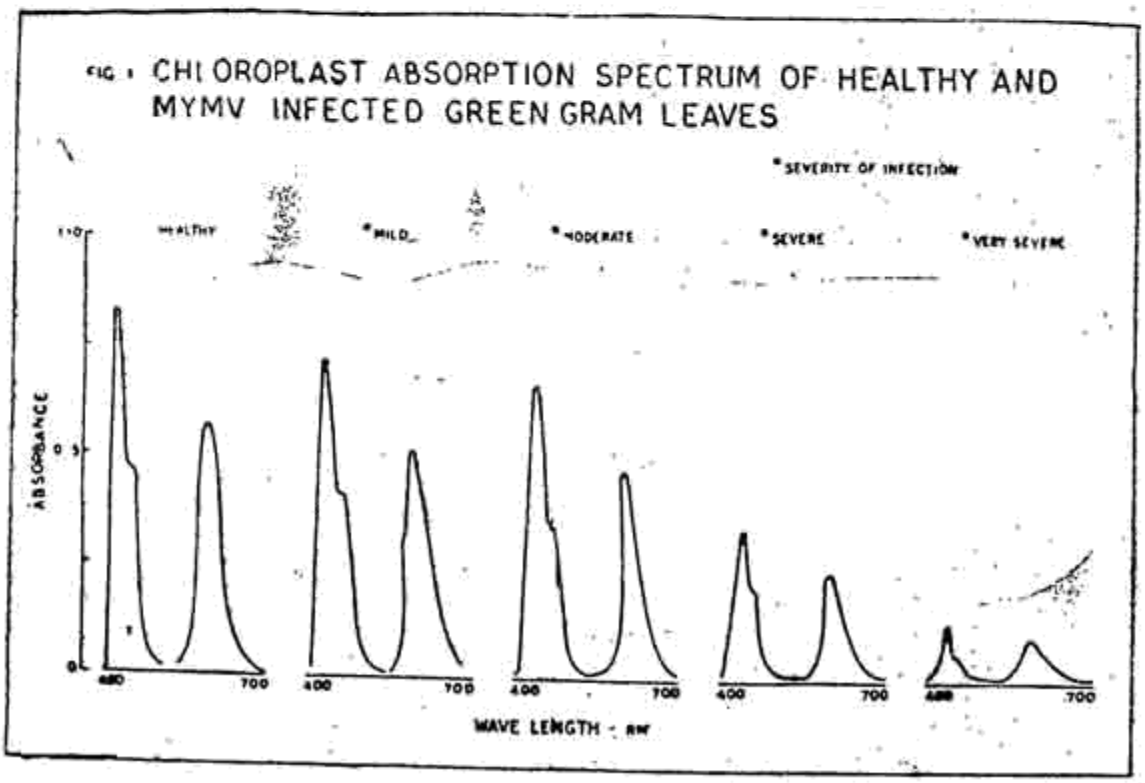
Severity of Infection	Photosynthetic Rate	Total Chlorophyll	Soluble Nitrogen	Reducing Sugar
Healthy	14.1	0.50	0.32	21.2
Mild Infection	11.0	0.41	0.42	26.4
Moderate Infection	7.2	0.26	0.49	30.3
Severe Insfection	5.3	0.20	0.56	37.9
Very Severe Insfection	4.3	0.10	0.70	43.5

Photosynthetic rate

Leaf photosynthetic rate decreased due to virus infection in greengram and the reduction ranged from 20 to 70 per cent as compared to healthy leaves depending upon the severity of infection. Similar result has been reported in tomato infected by yellow mosaic virus (Leal and Lastra, 1984) and in barley infected with yellow dwarf virus (Jenson, 1967). Padmanabhan *et al*, (1978) were of the opinion that virus destroys the photosynthetic apparatus in the host leaves.

Chloroplast cells

Derangement of photosynth sites viz., chloroplast cells in MY infected leaves has been depicted Fig. 1. The reduction in the absorpt spectrum in proportion with intensity disease establishes the fact that chlo plasts were destroyed by the vir Ahmad *et al*, (1983) recorded reducti in the number of functional chloropl cells in barley leaves infected w brown rust.



Soluble nitrogen and reducing sugars

An increase in the contents of both soluble nitrogen and reducing sugars in infected leaves was observed. Viral infection of bean leaves resulted in the accumulation of soluble protein components (Redolfi 1983) and it is probable that protein degrading enzymes are activated by viral infection. Breakdown of protein and starch molecules into soluble nitrogen and sugar fractions by mosaic virus infection was reported in chilli plants (Mishra and Jha, 1972).

Yield attributes

Significant reduction in yield in terms of pod number per plant, seed yield and 100-seed weight was observed (Table 2). Yield losses by yellow mosaic virus infection in pulses have also been reported by Raychaudhri *et al* (1977) and as there is likely that this might have resulted in decreased yield attributes.

Thus the present study gives an insight on the alteration in certain physiological characteristics in greengram infected by MYMV.

Table 2. Yield characters in healthy and MYMV infected greengram plants

Severity of Infection	Number of pods per plant	Seed Weight per plant (g)	100 Seed Weight (g)
Healthy	28.2	13.4	4 5
Mild Infection	22.6	9.3	4.1
Moderate Infection	23.6	6.2	2.4
Severe Infection	14.8	3.1	2.3
Very Severe Infection	13.9	2.5	1.9
CD at 5% P	7.3**	2.2**	0.2**

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EFFECT OF NITROGEN AND PLANT SPACING ON BACTERIAL LEAF BLIGHT OF RICE*

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The effects of three doses (0, 60 and 100 kg N/ha) of Nitrogen in the form of Urea and four plant spacings on the bacterial leaf blight (*Xanthomonas campestris* PV. *oryzae*) severity of five rice varieties/mutants (BR 4, Nizersail, Mut NS 1, Mut NS 2 and Mut NS 3) were determined under natural field conditions at the Institute of Nuclear Agricultural farm, Mymensingh during cropping season of 1982. The results indicated that there was no significant increase of bacterial leaf blight severity at all doses of nitrogen used. Closest plant spacing showed significant increase of disease severity than wider plant spacings. The interaction effect of the nitrogen doses applied and plant spacing was significant. The variety BR 4 showed significantly lowest disease severity followed by mutant NS 5, NS 2, NS 1 and Nizersail.

High nitrogen application and wider spacing between plants have been reported to increase the incidence and severity of bacterial leaf blight (BLB) of rice (Reddy *et al* 1979, Have and Kauffman, 1972). These authors together with others have expressed their opinion that the problem is severe with

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