



EVALUATION OF SOME BIOCHEMICAL CHANGES IN SOYABEAN CROP INFECTED WITH LEAF SPOT DISEASE

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ABSTRACT

Leaf spot is most common infectious disease recorded on soybean crop (*Glycine max* L. Merrill.) causing more than 30 per cent yield losses. Present study was carried out to evaluate the changes occurring in biochemical's viz., total sugar, reducing sugar, non-reducing sugar, protein and fat in healthy as well as infected foliage of soyabean crop. Results showed that in diseased foliage total sugar content was reduced drastically over healthy one, reducing sugar and non-reducing sugar contents were higher in healthy leaves (22.5% and 12.5 % respectively) than infected (8.5% and 7.3 %, respectively). Crude protein were higher (18.8%) in healthy leaves than infected (13.8%), from this work it is evident that the infection of Leaf spot disease causes drastic alternations in amounts of biochemical's in soybean crop.

KEYWORDS: Biochemicals, Crude protein, *Glycine max*, non-reducing sugar.

INTRODUCTION

Soyabean belongs to legume plant it has received a great attention all over the world as an important source of nutrition. The protein derived from soyabean is comparatively cheaper than the animal source of protein (Kaul and Das, 1986). Soyabean plant fixes atmospheric nitrogen as a result crop is less dependent on nitrogen chemical fertilizer (Hoque, 1978). Most of the people in India consume soyabean oil in their daily food dishes. A large number of soya products are successfully developed. Soyaproducts such as soyaflour, soyamilk, soyabread, soyabiscuits etc. are commercially produced in India.

All part of soyabean plants are susceptible to disease more than hundred pathogens are known to affect soyabean of which 35 are economically important diseases (Sinclair and Backman, 1989). Soyabean disease reduce yield on an average 10 to 30 % (Sinclair, 1994). In India soyabean suffer from many diseases among them leaf spot disease is an important disease that reduce yield of crop. Leaf spot disease is caused by various fungal pathogen viz., *Cercospora* spp., *Alternaria* spp., *Septoria* spp. etc.

The common biochemical constituents like chlorophyll, sugar, protein and fats are important in imparting resistance to crop plant but almost all living plant show biochemical changes after infected by infectious agents (Bora and Joshi, 2013). Biochemical changes due to

infection reported by many workers in different plant by different plant pathogens (Bashan, 1986, Gupta et al., 1980, and Waghmare et al., 2012) but there is little information seems to be available for biochemical changes in soyabean crop due to leaf spot disease.

Hence present investigation was carried with the objective to study the different biochemical changes in foliage of soyabean infected with leaf spot disease.

MATERIALS AND METHODS

For the quantitative estimation of primary metabolites different protocols were used. Leaves of the healthy and infected plant were collected, washed with distilled water, shade dried and powdered. The powder was used for analysis of total sugar, Reducing and none reducing sugar, protein and fat of the soyabean plants.

Estimation of total sugar: This was done by the Anthrone standard method (Sadasivam and Manikam, 2008). A standard curve was obtained using the following concentration of glucose in (mg/ml). 0.00, 0.20, 0.40, 0.60, 0.80 and 1.00. 0.5 and 1ml aliquots of each healthy and infected sample solution was measured into test-tube and 4ml anthrone solution added. This was heated for 8 minutes in boiling water bath. It was then allowed to cool. The absorbance was then read off a spectrophotometer at 630nm. The sugar concentration was then obtained by plotting standard curve.

Estimation of Reducing sugar and non reducing sugar: The DNSA method was followed 0.5 ml to 3ml Aliquots of alcohol free extract of healthy and infected leaves were taken making final volume 3ml in all tubes. Add 3ml DNS reagent and mix Heat for 5 min in boiling water bath. Add 1ml of 40% Rochelle's salt solution and measure the absorbance at 510nm in spectrophotometer Concentration of reducing sugar were calculated using standard graph of standard glucose solution. Non reducing sugar was calculated by subtracting values of reducing sugar from total sugar(Sadasivam and Manikam, 2008).

Estimation of Protein: The Biurette method (Thimmaiah, 2012) was adopted. 1ml of the sample solution of healthy and infected leaves was measured into test-tube and 6ml of biurette reagent was added. This was allowed to stand at 37^o C for 10 minutes. The absorbance was then read off at 520nm in a spectrophotometer. The quantity of protein was obtained by plotting standard curve prepared with bovine serum albumin (BSA).

Estimation of fats: It was estimated by using soxhlet method (AOAC). 2gm of Healthy and infected leaf

powder weighed and put into soxhlet apparatus and extracted with petroleum ether for about 8 hrs.

RESULT AND DISCUSSION

The experimental result obtained in present investigation showed the significant variation in healthy and infected soyabean leaves for different biochemical constituents (Table 1).

The result indicate that total sugar were higher in healthy leaves than infected ones. In infected leaves their amount was decreases. In healthy leaves the total sugar content is 35.4% whereas in infected leaves 15.8% that is %decrease is 19.6. Reducing sugar in healthy leaves is 22.5% over 8.5% of infected leaves. the %decrease in diseased leaves is 14.0. The non reducing sugar content is 12.9% in healthy than 7.3% in infected soyabean leaves. The % decrease is 5.6.

The protein content from healthy leaves of soyabean is 18.8% and it decreases to 13.8% in infected leaves. The % decrease in protein content was found 5.0. The fat content in healthy and infected was found 0.07% and 0.02% respectively, the %difference is 0.05.

Table 1: Estimation of biochemical's from healthy and infected soyabean leaves.

| Sr. No. | Biochemical's | Concentration (%) in healthy and infected soyabean plant | | |
|---------|--------------------|---|----------|-------------------------|
| | | Healthy | Infected | % Decrease over healthy |
| 1 | Total sugar | 35.4 | 15.8 | 19.6 |
| 2 | Reducing sugar | 22.5 | 8.5 | 14.0 |
| 3 | Non reducing sugar | 12.9 | 7.3 | 5.6 |
| 4 | Protein | 18.8 | 13.8 | 5.0 |
| 5 | Fats | 0.07 | 0.02 | 0.05 |

CONCLUSION

From the present findings, it can be concluded that there were significant reduction in total sugar, reducing sugar, non reducing sugar, protein and fat in infected soyabean plant over healthy plant. its signifies that the infection of leaf spot disease causes drastic changes in amount of biochemical's present in soyabean plant.

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