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Variation of crude fats in Rumex maritimus Linn. during infection with Ustilago parletoreii. F.A Wald

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Abstract – *The present paper deals with the variation of Crude fats in Rumex maritimus Linn. during infection with smut fungus, Ustilago parletoreii F.A. Wald. R. maritimus is an annual herb growing wild in different marshy places of Manipur. The leaves are cooked as a vegetable curry items by the local people of Manipur. The plant is often infected with smut fungus mostly at the midribs and soft portion of the stem. During the infection with Smut fungus Ustilago parletoreii, different metabolic changes were takes place. There is fluctuation of total crude fats, its degree of unsaturation and may synthesized low molecular weight of fatty acids during infection of the plant by this fungus.*

Keywords: Rumex maritimus, Crude fats, Iodin value, Sporulation, Saponification value, Acid value, Ester value, Ustilago parletoreii F.A. Wald.

1. INTRODUCTION

Rumex maritimus Linn. is an annual angiospermic herb belonging to the family Polygonaceae, and normally attains a height of 1-2 feets. It is an annual herb, mesophyte, distributed throughout the world. In young condition the shoot is filled with parenchyma tissue and gradually becomes hollow at the pit portion. The young shoots and leaves are often infected with smut fungus, Ustilago parletoreii. The infected plant is also used as food by the local people of Manipur. The black and brown spores are considered as palatable food by these people. The infected plant does not produce flower and no chances for seed formation. A number of workers have been studied on different Rumex species for its nutritional and phartakingtical activities [3,7,8,11,14]. A limited information is available on the study of physiological changes in control and infected tissues of R. maritimus [12,13]. Therefore, the present study aims to investigate the variation of crude fats in R. maritimus during infection with smut fungus.

2. MATERIAL AND METHODS

The seeds of Rumex maritimus were sown in the experimental field. Two seed beds are prepared for control and infection. The inoculated germinated seedlings take place for 90 days, thereafter the plants has started flowering. Fresh plant materials from both healthy and infected were collected and oven dried. Sets of 5g. oven dried at 60°C powdered from healthy and infected tissue samples after mashed through a 60 mesh sieve were taken for the extraction of crude fats. The spore of fngus were also taken after oven dried at 60°C.

The extraction of crude fats was performed following the procedure of AOAC adopted by Hart and Fisher [4] and Paech and Tracey [2,10]. On the basis of different stages of infection, the samples are divided into different terminologies i.e., preflowering (PF), flowering (F), pre sporulation (PS), very young sporulation (YS), mature sporulation (MS) and spore.

3. RESULTS AND DISCUSSION

Table 1 shows the levels of crude fats in the control (PF and F) and infected tissues (PS, YS and MS) of the leaves and Table 2 shows the levels of crude fats in the control (PF & F) and infected tissues (PS, YS and MS) of the young shoots.

Table -1: Variation in the crude fats content, expressed in mg/5g in the dried material at different stages of infection in the leaf tissues of the host plant Rumex maritimus infected with Ustilago parletoreii.

Leaves sample	PF	F	PS	YS	MS
Crude Fats mg/5g	210	230	286	297	182
Iodine value mg/g	9.52	9.12	9.86	7.48	4.52
Sap. Value mg/g	4.48	3.74	5.05	5.56	4.92
Acid Value mg/g	1.18	0.98	1.37	0.92	0.80
Ester Value mg/g	3.30	2.76	3.68	4.64	4.12

All the values are the mean of 5 replicates

Table -2: Variation in the crude fats content, expressed in mg/5g in the dried material at different stages of infection in the shoot tissues of the host plant Rumex maritius infected with Ustilago parletoreii.

Shoots sample	PF	F	PS	YS	MS	Spore only
Crude Fats mg/5g	282	290	293	385	240	293
Iodine value mg/g	11.25	11.27	12.83	11.37	10.12	3.66
Sap. Value mg/g	5.73	4.10	6.35	3.71	2.78	7.91
Acid Value mg/g	1.77	1.43	1.97	1.54	1.42	0.57
Ester Value mg/g	3.96	2.67	4.38	2.15	1.37	7.34

All the values are the mean of 5 replicates

The leaf and shoot extract in ether consist of crude fats. The amount of crude fats present per 5 g dried weight of the tissue decreases with intensity of diseases The extract when compare to the dried tissue consist only a small amount of fats. The level of fats in control leaf Pre-flowering (PS) & Flowering (F) was indicated to be 210mg/5g and 230 mg/5g respectively. With the advancement of infection, the level of fats in the leaf tissue slightly increases and followed by decreasing trend from 286mg/5g (PS), 297 mg/5g(YS) and 182 mg/5g (MS).

The same trend was also observed in the case of shoot tissues. The level of fats in the control shoot Pre-flowering(PS) & Flowering (F) was indicated to be 282 mg/5g and 290 mg/5g respectively. With the advancement of infection, the level of fats in the shoot tissue slightly increases and followed deceases from 293 mg/5g (PS), 385 mg/5g (YS) and 240 mg/5g (MS) respectively. The spore itself also found to be 293mg/5g.

The changes of Iodine value indicates the degree of unsaturated of the crude fats. The unsaturation levels are more or less similar in both leaves and shoot tissue. However, the unsaturation level of fats molecule increases first and sharp decreases in the infected plants leading to changes from unsaturated to saturated forms. Unsaturated fatty acids are coming into the limelight as one of the general defence systems against various biotic and abiotic stresses as reported by different investigators [1,5,6,9].

The changes in Acid value and Saponification value also occurred in the same trends in both leaves and shoots tissues. The changes in the Acid value indicates the characteristic changes of the fatty acid molecule in size or number of the acids in different stages of infection. The lowest acid value and Iodine value is found in spore due to modification of fats molecule.

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4. CONCLUSIONS

In the present study it may be concluded that differences in acid value, ester value have presented mere evidences about the changes of fats indicates during the flowering and infection period. Saponification value indicates the molecular size of the fats related to the size of fatty acid compound. This is observed to associate with the changes of fat contents and these findings reflected the idea about mobilization, deposition of new fats on the plants during infection.

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