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EFFECT OF FUNGAL INFESTATION ON OIL CONTENT OF MAIZE SEEDS

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Oil contents of maize seeds with different degrees of fungal infestation were compared with those of healthy seeds. Increasing infestation not only resulted in the deepening of colour of the oil but also decreased its percentage yield and its triglycerides contents. Silver-ion-adsorption chromatography of the triglyceride fractions showed that the component worstly affected by fungal attack were the ones with intermediary polarities.

INTRODUCTION

Grains and seeds not only constitute a major component of human food but are also used as raw materials for different industrial processes. Among these corn is one of the most important cereals. In Pakistan its production was about 798 thous and meteric tons during 1978-79 (Anonymous 1979). According to a conservative estimate about 10% of the total food grains are lost annually in Pakistan. (Ahmad 1955). These losses are mostly caused by rodents, insects and microorganisms. Besides these, fungi are the major casual agents of spoilage under ordinary aerobic storage conditions. The attack of fungi on seeds not only lowers their oil content but also affects the quality of oil.

The purpose of this work was to study the effect of fungal infestation on the quantity and quality of oil obtained from infested corn seed.

MATERIALS AND METHODS

In this study ten samples of corn seed with different degrees of fungal infestation were collected from godowns of Rafhan Maize Products, Faisalabad. For comparison, healthy and sound seed sample was also included in the study. Oil was extracted from the samples using Soxhlet extraction method (A.O.A.C. 1975). Following Carrol (1961) quantitative estimation of triglycerides of all the oil samples was done by column chromatography using florisil as adsorbant

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and diethyl ether: hexane (15:85) as solvent system. The triglyceride fractions were separated into their components by silver ion adsorption chromatography (de Varies, 1962) and Barret *et al.* (1962).

RESULTS AND DISCUSSION

Corn oil is a byproduct of the "wet and dry-milling" of corn *Zea mays*. Annual production in Pakistan is only about 10 thousand meteric tons, and is mainly consumed as edible oil in cooking. The corn oil is highly recommended for its high linoleic acid content (52–61%) and tocopherols which are 0.1% of the unsaponifiable fraction, accounting for its high stability. Lucconi (1979).

(a) *Effect on oil Content* :- It is apparent from Table-1 that the percentage yield of the oil and the glycerides as well decreased with increasing degree of infestation and the colour of the oil also decpend on excessive attack.

TABLE 1.

S. No.	Degree of infestation	Colour of the oil	%age yield of oil	%age of triglycerides
1.	0	Golden Yellow	4.44	18.33
2.	1-10	Deep Yellow	4.27	18.33
3.	11-20	Orange	4.26	17.00
4.	21-30	Orange	3.74	16.33
5.	31-40	Orange	3.53	15.00
6.	41-50	Amber	2.98	14.00
7.	51-60	Amber	2.26	13.66
8.	61-70	Amber	2.20	13.00
9.	71-80	Amber	1.16	10.33
10.	81-90	Amber	2.12	8.66
11.	91-100	Amber	2.03	3.33

Statistical analysis of the data revealed that the rate of decrease in oil content of the infested samples is 0.028% with every ten degree increase in infestation. Moreover the corn oil yields at 0.05% level were significantly different from one another. These findings are in accordance with the observa-

tions made by Heaton *et al.* (1978) who observed a decrease in oil content with increasing degree of infestation in safflower seeds.

(b) *Effect on Triglycerides Contents* :- A gradual decrease (Table 1) in percentage triglyceride yield was observed with increasing degree of infestation. The rate of descrease was found to be 0.1288% with every ten percent increase in fungal infestation. It was further observed that the triglycerides percentage yields different significantly among themselves at 0.05% level.

(c) *Effect on Composition of Triglycerides* :- The various components of triglycerides fractions when separated by silver ion adsorption charomatography gave yellow flouresence under U.V. light.

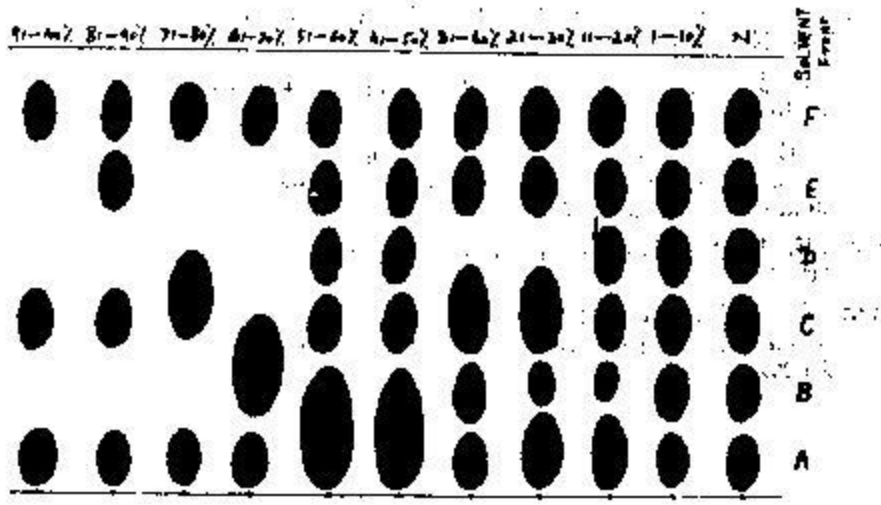

Fig 1 : Separation of Triglyceride Constituents by TLC.

Six spots marked as A,B,C,D,E, and F with their R_f values 0.07, 0.23, 0.38, 0.54, 0.70 and 0.86 respectively were observed in case of healthy seeds, in the separation pattron of triglyceride fractions and from seeds with 1-10% and 11-20% degree of infestation. A general look on the separation pattron (Fig. 1) indicates that the components of intermediate polarities (spots B,C,D, and E) were worstly affected by fungal attack as most of these were found missing in the triglyceride fraction of oils from seeds with degrees of infestation 60-70%. The complexity of triglycerides increases with increase in no. of fatty acids in

any given oil. Corn oil contains 8 different fatty acids varying in chain length and degree of unsaturation, and therefore have quite a complex mixture of triglycerides which are only identifiable with modern technique such as one described by Koman *et al.* (1978).

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