

DEVELOPMENT OF ERUCIC ACID AND GLUCOSINOLATE-FREE RAPESEEDS (CRUCIFERS) IN PAKISTAN

Part VI. Fatty Acid Composition of the Introduced 'Candle' Cultivar

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(Received May 29, 1985)

The fatty acid composition of the cultivar 'Candle' *B. campestris* seed oil has been determined for four generations. It has been observed that growing in the Pakistani conditions the erucic acid content in the seed oil has risen from 0 to 26.57%.

INTRODUCTION

The adaptation of erucic acid-free cultivar 'Candle' *Brassica campestris* in Pakistani environment has already been reported [1]. Since this cultivar has now been grown for a number of years, it was of interest to check its present position. This paper, therefore, describes the fatty acid composition of the 'Candle' seed oil, particularly the percentage of erucic acid in it.

The study was essential for a number of reasons which are outlined below:

- (1) The local *B. campestris* germ plasm, though high in erucic acid content, gives better seed and consequently oil yield and, therefore, could be preferred over the imported seeds.
- (2) Sowing of the imported erucic acid-free germ plasm in the vicinity of the local varieties rich in erucic acid could impair the qualities of the former because of cross pollination.
- (3) In the traditional rape seed cultivation practices, *B. juncea*, gives better yields than the *B. campestris* varieties and hence there is a tendency to prefer the former over the latter for economic reasons.
- (4) Resistance to diseases, particularly to aphids, could be better in the local varieties and there is less chances for the survival of the imported germplasm.
- (5) Character reversion in the imported germplasm particularly when not grown in isolation is a distinct possi-

bility.

Seeds for the 1981-84 crops were obtained from the Ayub Agriculture Research Institute, Faisalabad, where they were actually grown.

EXPERIMENTAL

Clean, dry and authentic seeds, representing various animal crops, obtained from the Ayub Agriculture Research Institute (Oil Seed Directorate) Faisalabad, were used to obtain oil.

The recovered oil was subjected to evaluation for fatty acid composition as reported previously [1]. The results are given in Table 1.

The percentage of oleic, linoleic, linoleic and erucic acids for the various crop years was plotted to note the

Table 1. Fatty acid composition of the 'Candle' seed oil crops from 1981 to 1984

Year.	Oil percentage	Fatty acid composition					
		C _{16:0}	C _{18:1}	C _{18:2}	C _{18:2}	C _{18:3}	C _{22:1}
1981	32.2	0.61	1.84	55.24	24.55	12.27	0.76
1982	32.2	3.52	3.18	29.92	19.36	18.48	25.53
1983	32.0	3.47	2.17	28.20	19.52	20.06	26.57
1984	32.6	4.73	3.42	35.98	16.09	17.04	22.73

increase and decrease in the respective crops. The graph of the percentage compositions versus the crop years is shown in Fig. 1.

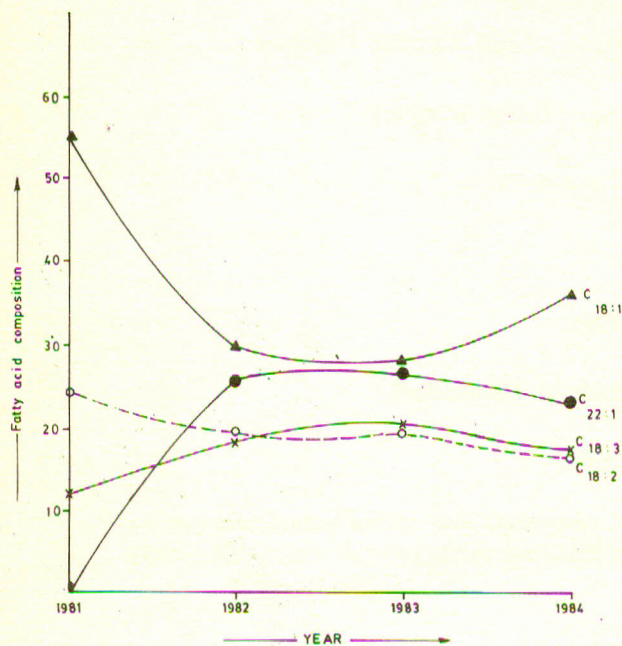


Fig. 1. Fatty acid composition of the Candle seed oil crops from 1981 to 1984.

DISCUSSION

Erucic acid levels of the imported 'Candle' germ plasm was reported to be zero. Later when these imported seeds were grown in Pakistan they showed remarkable performance and their erucic acid variation was noted from 0 to 13.55%. It was also observed that reoccurrence of the erucic acid was only in the seeds of the plants not grown in isolation [2]. Trial cultivation of these seeds, however, was started on a regular basis so that they could replace the local *B. campestris* varieties. This practice has now gone for almost five crop years and the fatty acid profile of the 'Candle' seed oil indicates that the erucic

acid content now stands roughly at 27% (Table 1).

It is of interest to mention here that the increase of erucic acid is at the expense of oleic and linoleic acids in the 'Candle' seed oil. As is seen from Table 1, when erucic acid is about 1% the percentage of oleic and linoleic acids is 55.2 and 24.5 respectively. However, this percentage changes to 29.9 and 19.31 when the erucic acid percentage came to about 26% in the 1982 crop. Mathematically it can be expressed that in order to show an increase of 33 times in erucic acid and the 'Candle' seed oil there has been a decrease of 44% and 21% in the oleic and linoleic acid (Fig. 1) respectively.

In addition to genetic factors, it is considered reasonable to argue that the instance of erucic acid occurrence in the 'Candle' cultivar is largely due to cross pollination with the pollens of high erucic acid varieties. The observation is based on the knowledge that when grown in isolation the erucic acid levels have been found to be rather low (zero to 2.4%). It has thus been inferred that the cultivar 'Candle' has a potential to replace the local *B. campestris* varieties for giving erucic acid free oil provided it is grown carefully and exclusively.

The performance of this cultivar has been comparable to other *B. campestris* varieties cultivated locally. In comparative evaluation it has shown equal yield and germination, resistance to disease and draught and almost the same oil yield. Although at the present stage it shows higher erucic acid levels than at the start, yet it has less erucic acid (27%) than the other local *B. campestris* varieties (40-60%).

REFERENCES

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