

REVELATION OF THE ORIGIN OF *B. CAMPESTRIS* AND *B. JUNCEA* IN CHINA BASED ON THE GEOGRAPHICAL FREQUENCY DISTRIBUTION OF ERUCIC ACID GENE POLYMORPHISM

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MATERIALS AND METHOD

The geographical frequency distribution of erucic acid gene polymorphism was analyzed with the use of erucic acid data from 1428 accessions of *B. campestris* germplasm and 814 of *B. juncea* collected from 1980 to 1990 in China. The erucic acid contents of them were measured with GC in our Institute. In *B. campestris*, since it was believed to be controlled by two alleles at a single locus (Dorrell & Downey, 1964) and the average content of erucic acid in Anhui Province was about 52%, which was the highest among the 20 provinces researched, three ranges were divided to present three different genotypes, i. e., 65.00-39.01% for EE<sup>+</sup>; 39.00-13.01% for Ee<sup>+</sup> and 13.00-0.00% for ee<sup>+</sup>. For *B. juncea* erucic acid was influenced by four alleles at two loci (Kirk & Hurlstone, 1983), and the highest average content of erucic acid was about 47% from Guizhou Province, so five ranges were divided, i.e., 54.00-42.01% for 4E; 42.00-30.01% for 3E; 30.00-18.01% for 2E; 18.00-6.01% for 1E and 6.00-0.00% for recessive OE. Dominant erucic acid gene frequency was calculated according to such grouping settlements.

RESULTS AND DISCUSSION

Erucic acid content, its gene frequency and the origin of *B. campestris*

It was revealed that germplasms in Anhui possessed the highest erucic acid in *B. campestris*, with an average content of 52.19% of 115 accessions. Followed provinces were Jansu (51.59%, 48 accessions), Yunnan (51.14%, 79), Hubei (50.51%, 137), Zhejiang (50.16%, 76) and Guizhou (50.85%, 109) etc. On the other hand, those in Qinghai (37.08%, 71), Gansu (35.03%, 28), Xinjiang (31.15%, 8), Heilongjiang (30.69%, 4) and the Inner Mongolia (25.88%, 5) had the lowest contents.

The erucic acid gene frequency was 100% in all the 7 provinces of Anhui, Jansu, Yunnan, Fujian, Hunan, Guangdong and Shanxi. For that in Qinghai, Gansu, Xinjiang, Heilongjiang and the Inner Mongolia, it was 66.901%, 58.929%, 56.250%, 50.000% and 66.667% respectively.

In addition, erucic acid data from 10 accessions of India germplasm were also studied. The average erucic acid content of them was 46.21% and the erucic gene frequency was 95% individually.

According to the results of quantitative research on Chinese races. Yunnanese and Jansu people, as well as Guizhou and Anhui people were closest genetically although they were much far away geographically (Du, et al, 1990).

Combining together all the facts mentioned above and other clues, it can be concluded that Anhui Province of South China, instead of India or any other places, might be the only original center of *B.campestris*. After its origin in Anhui, it might be spread to all China and then to other parts of the world through two ways. The first was the mainland way through which it was transferred to Jansu, Fujian, Guangdong, Hunan, Hubei, Zhejiang, and then to Henan Province. The other was the sea way through which *B. campestris* was carried from Anhui or Jansu to Yunnan Province. From Yunnan it was then spread to Guizhou, Sichuan, Shaanxi, Tibet, Qinghai, Gansu, Xinjiang, The Inner Mongolia and Heilongjiang. Still possibly through sea way, but in an opposite direction, it was carried to Hebei and Shanxi Province. Again from Yunnan *B.campestris* was spread to India, then to Middle East, Africa and some European countries through the South-West Silk Track. A long period later it was also transferred to Russia and the other European countries through the North-West Silk Track. When *B. campestris* was spread to places where *B. nigra* or *B. oleracea* existed, *B. juncea* or *B. napus* originated afterwards.

#### Erucic acid content, its gene frequency and the origin of *B. juncea*

It was showed that germplasms in Guizhou had the highest erucic acid in *B. juncea* with an average content of 47.36% of 132 accessions. Followed provinces were Yunnan

(47.16%, 140 accessions), Anhui(46.71%, 11), Sichuan(45.25%, 74), Jansu(44.81%, 2), Hubei(43.95%, 3), Janxi (43.47%, 8), Henan (42.80%, 4), Shaanxi(42.53%, 18), Hunan (42.01%, 2). Provinces with the lowest average contents were Tibet(38.09%, 11) , Gansu ( 35. 30%, 52), Qinghai (32. 82% , 84) , Shanxi( 29.83%, 149), the Inner Mongolia (25.65%, 32) and Xinjiang (23.28%, 92).

In provinces where a relatively large number of *B. juncea* germplasms were collected, the erucic acid gene frequency was 98.11% for Guizhou, 98.75% for Yunnan, 94.60% for Sichuan, 73.11% for Gansu, 67.86% for Qinghai, 60.07% for Shanxi, 53.91% for the Inner Mongolia and 47.28% for Xingjiang.

The situation in India an the former USSR were also studied with the germplasms available. The average erucic acid content and the gene frquency was 43.65% and 91.46% in India with 41 accessions, and was 33.47% and 64.29% in the former USSR with 7 accessions.

Since a lot of wild rapeseed related to *B.nigra* were found in Xinjiang and human activities among Xinjiang, Guizhou and Yunnan were active thousands of years ago, it was very likely that *B.nigra* was brought from xinjiang to Guizhou and Yunnan where it crossed interspecifically with *B. campestris* and hence *B.juncea* originated. So Yunnan and Guizhou might be the original centre for *B.juncea*.

#### REFERENCES

- Dorrell, D.G., and Downey, R.K. (1964). The inheritance of erucic acid content in rapeseed (*Brassica campestris*). *Can. J. Plant Sci*, 44, 499-504.
- Kirk, J. T.O. and Hurlstone, C.J.(1983) . Variation and inheritance of erucic acid content in *Brassica juncea* *Z. Pflanzenzuchtg*, 90, 331-338.
- Du, R. et al (1990). *Chinese Surnames and the Genetic Differences between North and South China*. Stanford University Press. 80P.