

XINJIANG WILD RAPE

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MORPHOLOGICAL CHARACTERISTICS AND CLASSIFICATIONS
OF XINJIANG WILD RAPE

Two hundred and seventy-six wild rape seeds and 79 plant specimens were collected during on-the-spot investigation in 1986. According to morphological identification they belong to a mustard plant of genus *Brassica* L.

One Hundred seeds collected in 1986 and 20 seeds collected and stored in 1964 were planted and observed in 1987.

Most seedlings of Xinjiang wild rape are creeping and cotyledons are kidney-shaped. Most of the young stems are slightly purple. The height of plants is 135 cm. (ranges from 103 to 179 cm.) Stems are cylindraceous. There are many throny hairs on a stem covered by waxy powder. Leaves are green, smooth and membranous. Petioles are short. The edge of leaves is parted, and there are 3 to 8 lobes. The surface of leaves is not covered by waxy powder. Leaf veins are green-and-white or purple. There are purple spots at most leaf axils. Flowers are small. Average diameter of corollas is about 1.5 cm. and yellow. Petals are explanate, separating and bat-form. The stamens of a blooming flower are longer than the pistils, but the stamens of a few plant flowers are shorter than the pistils. Flower buds are not open for other plants, but their stigmas appear. There are a few pollens or nothing. Most inflorescences are shorter. Flowers can fruit normally below the middle part of inflorescences. Upper flowers of inflorescences cannot fruit, but the pistils develop well. Siliquae are short and small (1.1-3.9 cm. long). Siliquae rostrums are longer. Siliquae coats are thicker. There are 2 to 18 seeds in a silique. Seeds are globose or subglobose, black or black-and-brown. There are clear reticulate lines on the surface of seed coats. The weight of a thousand seeds is 2 grams.

Morphologically Xinjiang wild rape shows that there are many classifications. If the classification is based on whether there are purple spots at the leaf axils or not, and whether siliquae press close to inflorescences or not, and based on the developed degree of silique rostrums and the colour of the side of the plant exposed to the sun, 49 to 79 plant specimens collected in 1986 are classified into 10 classifications as follows (Gao *et al.* 1988). (The other 30 plant specimens are not classified.)

1. There are purple spots at the leaf axils. Leaves on the base are ovoid or lobose or hastate and are not stem-clasping. There are angulates or nothing on the stem. The separating angle of branches is large. There are many throny hairs on a stem. The edge of leaves is entire or sawtooth-shaped.
2. Siliques press close to inflorescences.
3. There are well-developed silique rostrums.
4. The side of the plant exposed to the sun is purple. (Specimen No.40, 52, 73)

4. The side of the plant exposed to the sun is not purple. (68, 64, 86)
3. There are poorly-developed silique rostrums.
 4. The side of the plant exposed to the sun is purple. (20-1, 35-2, 36, 30)
 4. The side of the plant exposed to the sun is not purple. (42, 50, 61, 70, 72, 74, 76, 79, 80, 81, 83 85, 87, 88, 94, 97)
2. Siliquae grow obliquely.
 3. There are well-developed silique rostrums.
 4. The side of the plant exposed to the sun is purple. (49, 66)
 4. The side of the plant exposed to the sun is not purple. (79, 93)
 3. There are poorly-developed silique rostrums.
 4. The side of the plant exposed to the sun is purple. (23, 32, 62, 67)
 4. The side of the plant exposed to the sun is not purple (22, 24-1, 46, 63)
1. There are no purple spots at the leaf axils. Leaves on the base are lanceolate and petioled and are not stem-clasping. There are angulates or nothing on a stem. The separating angle of branches is large. There are many thorny hairs on a stem. The edge of leaves is sawtooth-form.
 2. Siliquae press close to inflorescences.
 2. Siliquae grow obliquely.
 3. There are well-developed silique rostrums.
 3. There are poorly-developed silique rostrums.
 4. The side of the plant exposed to the sun is purple.
 4. The plant exposed to the sun is purple. (38, 95, 96)

The number of its chromosome is $2n = 18$ which may be confirmed to be a stable new species according to observation we have made for the chromosome of the roots of 170 seeds and of the pollen mother cells for many years, although Xinjiang wild rape morphologically has many classifications. Morphologically there are some similarities between it and B. nigra in that the number of chromosome is $2n = 16$. But they are not common at all in the plant morphotype, branch pattern, the number of stomas on the surface of a leaf, the number of vascular bundles in the middle vein and the reticulate lines on the seed coat. The affinity index crossed with B. nigra is merely from 0.020 to 0.279.

RELATED PLANTS OF XINJIANG WILD RAPE

Forty-nine plants related with genus Brassica L. of family Cruciferae were collected during Xinjiang wild rape investigation. By identification they are classified 11 genera and 16 species.

- (I) Genus Arabis L. It includes some species as follow[s]:
1. A. hirsuta (L.) Scop.
It is an annual herb.
 2. A. flagellosa Miq.
It is a perennial herb.
 3. A. paniculata Franch.
It is an annual herb.
 4. A. glabra. Bernh., (A. perfoliata Lam.)

- (II) Genus Draba L. It covers the following species:
 1. D. nemorosa L.
 2. D. nemorosa L. var. leiocarpa Lindbl.
 in Linnaea 8: 33. 1839: Lédeb. Fl. Ross. 1: 154.
 1842; O.E. Schulz in Engl. Pflanzenr. 89 (4).
 105): 314, 1927.
 3. D. ladyginii Pohle.
- (III) Genus Thlaspi L.
 It is an annual herb.
- (IV) Genus Barbarea R. Br.
- (V) Genus Erysimum L.
- (VI) Genus Cardamine L. It covers the following species:
 1. C. impatiens L.
- (VII) Genus Cheiranthus L.
- (VIII) Genus Chorispora R. Br.
- (IX) Genus Descurainia Webb. et Berth.
- (X) Genus Camelina Crantz.
- (XI) Genus Sinapis L.

UTILIZATION VALUE OF XINJIANG WILD RAPE

On the basis of analyses made by the Institute of Oil Crops Research, Chinese Academy of Agricultural Sciences for fatty acid composition of 154 Xinjiang wild rape seeds in 1988, their erucic acid content is 5.23 to 37.04 per cent, and average content was 14.44 per cent, which is lower than that of E. juncea, E. napus and E. campestris in China. Their linolenic acid content was higher, from 11.86 to 31.38 per cent, and average content was 23.28 per cent (Qian et al. 1988). In the light of determinations made by the Institute of Industrial Crops, Xinjiang Academy of Agricultural Sciences, their glucosinolate content was lower, 0.74 to 1.05 per cent.

The seed protein of rape often consists of 20 kinds of amino acids. The number of 20 kinds of amino acid is changeable for different varieties. The equilibrium degree of all kinds of amino acids that consists of protein is standard judging nutritive value of rape seeds to be high or low. Hunan Agricultural College analyzed the amino acid composition of 16 Xinjiang wild rape seeds and 14 seeds of different varieties in 1988. The result showed that amino acid composition of wide rape is more balanced. Total content of its amino acid and total content of its essential amino acids was 31915.94 mg in average 100 g samples containing 19 kinds of amino acids (ranging from 28923.8 to 34185.5 mg), and are more than that of Oro, and are less than that of others. The tyrosine content is evidently higher than Yili Yellow Rape, E. nigra var. junlus and Oro (Wang et al. 1988).

From 1986 to 1988 the Institute of Industrial Crops, Jiangsu Academy of Agricultural Sciences identified Xinjiang wild rape and Yunnan wild rape resistance to viruses and sclerotinia disease. The results show that Xinjiang and Yunnan wild rape resistance to viruses is low. But Yunnan wild mustard resistance to disease is stronger than Xinjiang wild rape. Xinjiang wild rape resistance to sclerotinia disease is stronger than Yunnan wild rape; whereas Yunnan wild rape resistance to sclerotinia disease is stronger than Yunnan wild cabbage (Chen et al. 1988).

CONCLUDING REMARKS

It is stated above that the Xinjiang wild rape resource is rich. There are 94 genera and more than 300 species of the family Crucifera in China including 65 genera, 158 species and 29 varieties in Xinjiang. The linolenic acid content of the seeds is higher, and the erucic acid and glucosinolate content is lower, and the amino acid composition is more balanced, and the resistance to sclerotinia is stronger, which are important characteristics for breeding good varieties of rape. So Xinjiang wild rape is precious germplasm resources. But some regions in Xinjiang have not been investigated up to now. And hundreds of wild rape resources that have been collected have not been analyzed and studied systematically, and have not been systematically identified and observed according to morphology and cytology, and have not been systematically inoculated, cultivated and identified with respect to the resistance to diseases in disease plots, and have not been reproduced and put in storage. Therefore, it is important and academically significances to study further wild rape resources for enriching resource storages and breeding good, high yielding, strongly resistant varieties to adverse circumstances. We give the International Development Research Center (IRDC), Canada, and the Resource Committee of Plant and Heredity of the Food and Agriculture Organization of United Nations (FAO) a warm welcome. We hope you invest in Xinjiang and investigate. Let us exploit and utilize Xinjiang wild rape and related germplasm resources. In addition, according to recent study it is considered that the northwest of China, central Asia and the northwest of India including Pakistan and Kashmir are the first origin center of B. juncea. Therefore, Xinjiang wild rape might be an original species. It is important to the study of the origin and evolution of rape.

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