STUDIES ON CLASSIFED STATUS OF XINJIANG WILD RAPESEED AND THE ORIGIN AND EVOLUTION OF BRASSICA JUNCEA

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ABSTRACT

Xinjiang wild rapeseed (XWR) is a compound colony which are consisted of many variations. One new species is named Brassica Xinjiangensis Y.C. Lan. Most of XWR belong to 4 species and 4 variations of Sinapis genus. In this paper, we discussed the classified status and function of XWR in the origin and evolution of Brassica Juncea .

INTRODUCTION

In this paper, we want to discuss the relation between wild rapeseed and cultivars of Brassica genus, to carry out chemical classify and systematic research, and probe the classified status and it's function in origin and evolution to B. juncea.

RESULTS AND DISCUSSION

1. Classifying and naming the new species of XWR colony

According to our researchs in morphology, anatomy, cytology, chemical analysis and affinity in crossing, we named one of the main colony of XWR as B. Xinjiangensis Y.C. Lan, it's morphological characters、seed anatomy、pollen patterns and number of chromosome are all different from B. nigra. Moreover, we found that most wild materials belonged to Brassicea Sinapis. After identifying these specimens, we divided them to 4 species and 4 variations, they were:

(1) Sinapis arvensis.
  (1a) S. arvensis Var. stricta.
  (1b) S. arvensis Var. divaricata.
  (1c) S. arvensis Var. brevirostris.
(2) Sinapis pubescens.
  (2a) S. pubescens Var. aristidis.
(3) S. flexuosa.
(4) S. ancheri.

This discovery raised new problems for the origin and evolution of rapeseed.

2. Chemical classify and systematical research

2.1 The isoenzymes staff of esterase and peroxidase of six cultivars of Brassica had specialities of the species. Variation between varieties is little, and there is a parallel relation between isoenzymes tapes and chromosome sets.

2.2 There exist certain variation of isoenzymes staff in different populations or strains. we can sorted them to various types.

2.3 The isoenzymes staff of Brassica Juncea is very like to some populations of XWR (such as wild No. 10) and B. Campestris L..

3. Research of the classified status of XWR

3.1 XWR is a complex population which is consisted by many variations.

(1) In morphology and anatomy, such as splinter of stem, stem color, basic color of branch, habits and characteristics of branching, leaf color, leaf shape of stem, etc., there is certain degree variation between different populations or strains.

(2) In biochemistry, wild rapeseed can be divided to two types according to the composition of glucosinolate, one is main Butenyl (more than 95%), another is main Allyl (more than 95%). In the cultivars of Brassica rapeseed, except B. Juncea, the composition of glucosinolate are basically stable. Such as B. nigra, Allyl is main

glucosinolate in seed;

3.2. XWR is not the same species with B. nigra, but there has closely relation between them.

The results of cytological research show: the chromosomes of XWR is mainly n=9, 2n=18, but B. nigra mainly n=8, 2n=16, the two are not the same species. The two have different numbers of chromosomes, moreover, Xinjiang wild rapeseed is a stable species. The cross affinity between XWR and nigra is low, and the rate of bearing seed is low, too. It shows that the two can not be divided in one species. Their isoenzymes staff and composition of glucosinolate are different. In morphology and anatomy, there are a lot of common places between XWR and nigra, so, the two possibly have closely relation, but they are not the same species.

4. Research on the origin and evolution of B. Juncea

According to 'Yu Shi Triangle', B. Juncea is the natural double diploid hybrid of interspecies between B. nigra and B. campestris. K. Yamashita (1979) pointed out, usually the original area of double diploid crops is the place where it's ancestors can be found. J. G. Vaughum (England, 1963) considered, B. Juncea originates from which B. nigra and B. Campestris cross several times independently. China is one of the original places of B. Juncea and B. Campestris. According to predecessors and latest research, we sorted following conclusions:

(1) The colony of XWR exist more variation types than West Germany, Switzerland and Belgium of Europe.
(2) In cytological research, the nuclear pattern of XWR is 1A, it is more primitive than nigra (2A), but there are common places in the two ones.
(3) In biochemistry, the variation types of XWR have characteristics on isoenzymes staff of bb chromosome set, in some degree.
(4) In geographical distribution, Xinjiang wild rapeseed extensively distributes in northwesten regions of China, at geographical situation, it joints with central Asia, northwesten India, Pakistan and Kashmir.

So according to the theory of Plant Original Center of N. Z. Vailov (1926, 1935, 1949): the plant where there are more varieties or variation types and rich genes kinds of a species than other places, should be the original center of this species. So we consider, northwesten regions of China joint central Asia, northwesten India, Pakistan and Kashmir together form the origin and evolution center of bb chromosome set of Brassica.

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