New idioplasmic resource *B. napus* L. with multi-loculus founded by interspecific hybridization

ZHAO Hongchao, AN Fengyun, DU Dezhi

Qinghai Academy of Agriculture and Forestry, Xining, 810016, China Email: qaazhc@163.com.

Abstract

Multi-loculus *B. juncea L.* (more than three loculus pod separated by septa), distributed over the Qinghai province, would have 10-20 seeds per pod more than that of common rapeseed, some of the multi-loculus materials had over 90 per cent multi-loculus pod, and were the excellent regional rapeseed resource. Through the reciprocal crossing between *B. juncea L.* with multi-loculus and *B. napus* L., and recurrent selecting among interspecific generations, 5 new *B. napus* L. with multi-loculus idioplasmic resources were bred, in which the multi-loculus pod rate could reach 76-96%, multi-loculus plant rate reached 83-98%; Seeds per pod reached 35-51, seed weight per plant reached 24-28.2g, it was increased 16.7-70% and –2.4-14.6% respectively by comparing to the conventional variety qingyou No.14; Besides all above, the content of erucic acid, glucosinolate and oil content of there materials were 3.2-0.6%, 35-27.6μmol/g and 40.18-42.59% respectively.

Key words: *B. juncea* L. with multi-loculus, Interspecific hybridization, Idioplasm, *B. napus* L. with multi-loculus

Introduction

In our previous study, the average yield per plant of *B. juncea* L. with multi-loculus, produced from the same backcross generation BC_1, was remarkably higher than that of common's *B. juncea* L. because of more seeds per pod instead of pods and 1000-seed-weight[1]. To enhance the yield by increasing seeds per pod and richen the genetic resource of *B. napus* L., some new idioplasmic resources of *B. napus* L. with multi-loculus were bred by transferring multi-loculus trait from *B. juncea* L. with multi-loculus to *B. napus* L. from interspecific hybridization between *B. juncea* L. and *B. napus* L.[2].

Materials and Methods

1 Materials

1.1 *B. juncea* L. with multi-loculus

B. juncea L. with multi-loculus in Qinghai Province possessed more than three loculus pod separated by septa, which had 10-20 seeds per pod more than that of normal *B. juncea* L., the characteristics of yield and quality were respectively summarized in Table 1 and Table 2.

Table 1 Yield characteristics of *B. juncea* L. with multi-loculus

Material	Origin region	Growing stage(d)	Plant height (cm)	Yield per plant (g)	Pods per plant	Seeds per pod	TSW (g)
B. juncea L. with multi-loculus	Qinghai	126	200	28.1	421	30	2.23
Conventional *B. juncea* L.	Qinghai	128	190	19.6	464	18	2.38

Note: TSW-1000 seed weight

Table 2 Quality and other characteristics performance of parental materials

Parental material	Origin region	Growing stage(d)	Seed color	Glucosinolate (μmol/g)	Erucic acid (%)	Oil content (%)	Yield per plant (g)
No.14	Qinghai	106	Brown	27.6	0.1	42.43	24.6
93-221-1	Qinghai	110	Yellow	24.65	0	39.11	23
1321	Qinghai	115	Brown	22.79	0.25	47.42	24.1
AgrEvo-18	Canada	109	Yellow	21.87	0	44.31	23.9
Topas	Sweden	120	Brown	21.87	0.18	35.19	22.1
B. juncea L. with multi-loculus	Qinghai	128	Yellow	86.69	25.52	27.99	28.09

1.2 Parental materials (B. napus L.)

6 *B. napus* L. materials summarized in Table 2 performed superior quality characteristics such as low content of erucic acid and glucosinolate, No.14 was a conventional cultivar around the whole spring rapeseed regions in China and confirmed as a check in this paper. We hope to get multi-locular *B. napus* L. with double-low characteristics by interspecific hybridization between *B. juncea* L. with multi-loculus and *B. napus* L..

2 Methods

The interspecific generation F_1 was obtained from *B. juncea* L.×*B. napus* L., in the following generations, the method of recurrent full sib selection and quality analysis were adopted to breed *B. napus* L. with multi-loculus.

Results

Through transferring multi-loculus trait from *B. juncea* L. to *B. napus* L., 5 new idioplasmic resources *B. napus* L. with multi-loculus were bred out. Their characteristics were as follows:

1 Quality characteristics

Oil contents of created 5 *B. napus* L. with multi-loculus were comparatively high (see Table 3), in addition, the contents of erucic acid and glucosinolate of the 5 resources accorded with domestic industry double-low rapeseed standard established in 2001.

Table 3 the quality characteristics of 5 new *B. napus* L. idioplasmes with multi-loculus

No		New idioplasm	Origin combination	Erucic acid (%)	Glucosinolate (μmol/g)	Oil content (%)
1	248	*B.juncea* L.	with multi-loculus×No.14	0.6	32.8	41.21
2	351	*B.juncea* L.	withmulti-loculus×93-2	3.1	35	40.18
3	208	*B.juncea* L.	with multi-loculus×1321	1.4	28.9	42.59
4	220	*B.juncea* L.	with multi-loculus×AgrEvo-18	3.2	31.4	40.35
5	403	*B.juncea*L.	withmulti-loculus×Topas	2.2	32	41.75
6	No.14(CK)			0.1	27.6	42.43

2 Multi-loculus and yield characteristics

New created *B. napus* L. with multi-loculus possessed of some superior characteristics such as high yield and steady multi-loculus performance, in Table 4, the multi-locular plant rate reached 83-98%, multi-locular pod rate reached 76-96%; the yield per plant had been distinctly increased, checked to variety No.14, the yield per plant of 248 increased 1.9g; checked to AgrEvo-18, the yield per plant of 220 increased 4.3g, and the yield per plant of other idioplasms increased 1.9-4.3g compared to corresponding parental materials. Further more, the results showed that the more seeds per pod was the key factor of increasing yield in new created *B. napus* L. with multi-loculus, which was accorded with that of *B. juncea* L. with multi-loculus[1], all above showed that the character multi-loculus of *B. juncea* L. had expressed perfectly in *B. napus* L.

Table 4 Multi-loculus and yield characteristics of new idioplasmic *B. napus* L. with multi-loculus

No. New idioplsm	Multi-locular	plant rate(%)	Multi-locular pod rate(%)	Pods per plant	Seeds per pod	TSW (g)	Seed yield per plant(g)
1	248	98	96	232	35	3.3	26.5
2	351	90	92	207	40	3.2	26
3	208	92	90	213	36	3.5	26.1
4	220	90	87	194	51	3.3	28.2
5	403	83	76	210	41	3.0	24
6	No.14(CK)			224	30	3.5	24.6

Discussions

The multi-locular trait of *B. juncea* L., controlled by a pair of main recessive genes lied on genome B (Zhao Hongchao etc., publishing), had no cytoplasm effect[3], 5 created *B. napus* L. could express perfectly multi-loculus performance, which means multi-locular gene in chromosome B had been transferred into genomes of *B. napus* L..

5 new *B. napus* L. idioplasms with multi-loculus performed superior quality and high yield, which possessed some potential value in production and application. In addition, we'd gotten some *B. napus* L. materials with pod shatter resistance, yellow seed, male sterility with *B. juncea* L. cytoplasm and apetal etc. by selecting from generations of *B. juncea* L.×*B. napus* L., these materials, as well as the created *B. napus* L. with multi-loculus in the paper, would be important in broadening genetic basis and utilization in *B. napus* L..

References:

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