IDENTIFICATION OF NEW STERILITY MAINTAINERS FOR POLIMA CMS SYSTEM IN BRASSICA NAPUS L.

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ABSTRACT

Very few stable male sterility maintainers of stable male sterility experession are available for polima CMS system. We have now succeeded in identifying nine stable maintainers of this system. The male sterility in these CMS lines was maintained even upto 32°C. Screening of F_1's between stable CMS and potential maintainer lines, under high temperature conditions was found to be an efficient initial screening sieve.

INTRODUCTION

The wide spread utilization of Polima (*pol*) CMS for producing F_1 hybrids is limited by the partial fertility restoration of CMS at 30°C/24°C or above. Recent studies have, however, shown the possibility of developing stable CMS lines by simple breeding manipulation of the nuclear background (Fu *et al.*, 1990).

In present communication we report the identification of nine maintainers for temperature neutral expression of male sterility in this system.

MATERIAL AND METHODS

The experimental material comprised 25 diverse CMS lines (BC_6 stage), and 59 F_1 and BC_1 progenies derived through crossing a locally bred stable *pol* CMS line (pMS 602) with different genotypes of *B. napus*. Stability of male sterility expression was assayed throughout the crop season. Freshly opened flowers were sampled every third day during entire flowering period (January to March). Each sample of specified genotype was assigned a visual male fertility index (0, 1 stable sterile; 2, 3 partially fertile and 4 completely fertile). Anther to stigma ratio and pollen fertility was also observed. For studies under controlled temperature (32°C/26°C), the plants just at bolting stage were shifted to the plant growth chamber with 16 h photoperiod. After seven days of this treatment, the temperature was lowered to 22°C/14°C. Assaying for male sterility expression was continued until 20-30 days after high temperature

treatment.

RESULTS AND DISCUSSION

The quantification of male sterility expression revealed that stability/unstability of the CMS expression was manifested in the developmental pattern of anthers and filaments, rather than *per se* increase or decrease of fertile/sterile pollen grains. Reversion to fertility was always associated with increased pollen abundance. Based on variation in male fertility index (MFI) and anther stigma ratio (ASR), 12 CMS lines could be categorised in three groups namely stable sterile, low temperature sterile, and high temperature sterile. Remaining 13 lines had variable male sterility expression. Temperature range of sterility expression and frequency of stable sterility maintaining genotypes is shown in table 1.

TABLE 1. Male sterility maintainers and temperature range of expression

Category	Temperature (0°C)		Maintainer Genotypes
	Minimum	Maximum	
Stable sterile	4.6-16.4	17.6-32.2	9
Low temp.sterile	4.6- 7.8	17.6-23.22	2
High temp.sterile	15.0-20.8	27.8-33.0	1

Notable maintainers for temperature neutral sterility expression were NL 88-26, NL 88-35, NL 88-40, NL 89-00, NL 89-03, NL 89-43, NL 602, Puma and WRG 15-1.

Our studies demonstrated that the stability of *pol* CMS was determined by the nuclear background of the female parent. Role of environment regulators on CMS expression is well documented and in majority of instances a strong interaction of temperature with latent fertility restoration mechanism was indicated (Kaul, 1988). Further, the analysis of male sterility expression in 59 F_1 and BC_1 generation crosses confirmed an earlier observation (Fu *et al.*, 1990) that breakdown of CMS results from certain modifiers of sterility expression which have small but additive action. High temperature treatment appeared to enhance the expression of character (stability vs unstability) by influencing critical phase during microsporogenesis. It is suggested that backcrossing programme to develop new CMS lines may be initiated only if the F_1's (CMS x potential maintainer) show low MFI/ASR after high temperature treatment.

REFERENCES

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