

The First Fully Restored F1-Hybrids of Winter Oilseed Rape

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Several hybridization systems in rapeseed have been described in the past and are currently in use. A new and unique CMS-system has been developed from NPZ- Lembke, named MSL (Male Sterility Lembke). This system has its origin in a number of sterile single plants selected as spontaneous mutants in our nurseries 1983. These plants were cloned and pollinated with different lines. Following a large screening programme-carried out at the plant breeding research institute of Prof. Röbbelen, University Göttingen - suitable maintainer and restorer genes could be selected. Today the system can be characterized as follows :

- Maintainer genes must be selected very carefully in a unique cytoplasm in genic background. This maintainer material is the property of NPZ-Lembke only.
- Restorer genes are very frequent, all varieties tested are restorers, the restoration is a perfect one.
- Selection of different modifier genes are necessary in order to have a high level of environmental stability of the male sterility.
- Sterile flowers are attractive for insects, the nectaries are normally developed.

Since 1989, first MSL-motherlines in winter and spring material have been available and thousands of test crosses have been produced since that time. The use of MSL-motherlines has a great advantage, as it is not necessary to backcross restorer genes into the pollinator material, all varieties/lines can be directly used as restorer lines. Therefore the system is very flexible at the side of the fatherlines.

F1-hybrid varieties of spring oilseed rape are listed in Denmark (ORAKEL) and there are promising candidates in the Canadian COOP trials (PF 7056/92, SWLM 02578, SWLM 02579).

After testing in official trials following winter hybrid varieties based on the MSL-system are listed today :

winter oilseed rape	listed in	since
JOKER.....	Germany	1995
PRONTO.....	Germany	1995
	UK	1996
PANTHER.....	Germany	1996
ARTUS.....	UK	1996
KASIMIR.....	Sweden	1996

The yield performance of these hybrids is very promising (see Table 1).

Table 1. Relative seed yield in official German tests (Bundessortenamt)

Variety	assortment/year					φ
	K1/94	K2/94	K2/95	K1/95	K2/96	
Lirajet.....	98	101	101	100	105	102
Falcon.....	102	99	99	100	95	98
Express.....			102	105	101	103
Synergy (CHL).....	118		113			116
Joker.....		115			107	111
Pronto.....	111		119			115
Panther.....				125	110	119
Artus.....				121	112	117

First yield data from farmers fields in 1995/96 have verified the yield improvement under farm practice. Furtheron these fully restored hybrids have shown excellent yield stability even under worse conditions. The variety KASIMIR - a joined F1- combination with a Svalöf Weibull pollinator line - is an example for getting heterotic effects also in winter-hardiness.

The seed production of the mentioned hybrids have been started in 1995/96. There are approximately 30.000 hectares (3,5 % of total market) planted with the fully restored hybrids JOKER and PRONTO in Germany in 1996/97.

All data up to now have shown that there is no interaction between the MSL-hybrid system and glucosinolate content. Only the seed produced on the motherline can have increased glucosinolate contents, but the seed harvested from the commercial crop of F1-hybrids have low and stable glucosinolates (see Table 2).

We are expecting further progress in yield potential and also in characters of yield stability like standing power, disease resistance of future F1-hybrids of winter oilseed rape based on the MSL-system.

Table 2. Glucosinolate content ($\mu\text{mol/g}$ seed) (Bundessortenamt)

Variety	assortment/year					ϕ
	K1/94	K2/94	K2/95	K1/95	K2/96	
LIRAJET	12,76	11,05	12,23	11,78	14,99	13,04
FALCON	9,30	7,78	13,58	13,28	13,79	13,48
EXPRESS			16,87	16,65	17,03	16,80
SYNERGY (CHL)	14,16		16,44			15,48
JOKER		9,14			14,44	11,79
PRONTO	10,18		11,55			10,97
PANTHER				12,54	14,47	13,30
ARTUS				11,64	14,03	12,57