

EFFECT OF VARIOUS CYTOPLASMATIC MALE STERILITY SOURCES(CMS)
ON SOME SUNFLOWER QUALITIES

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INTRODUCTION

The CMS source discovered by Leclercq(1969) is a basic one and is widely used in hybrid sunflower production. Using one and same source, however, is a great risk and therefore all countries dealing with sunflower breeding, seek and study new CMS sources.

MATERIALS AND METHODS

In pursuance of a joint FAO programme for research and exploration of new CMS sources, three new ones(ANN-1, ANT-1 and PET-2), consigned by Dr Serieys, France, have been studied at the Institute for Wheat and Sunflower near General Toshevo, Bulgaria.

The investigation was carried out at the IWS in the period of 1988-1991.

The test material comprised 8 sterile analogues in BC-5 together with their stabilized self-pollinated lines. By back-cross lines 1234, 1734, 2184, 2860, 2759, 3004, 3230 and 3894 have been transferred to the three CMS sources studied.

Effect of the different CMS sources(ANN-1, ANT-1 and PET-2) was observed on the following characteristics: plant height, head diameter, leaf number, seed yield per plant and oil content of the seeds.

RESULTS AND DISCUSSION

Table 1 presents the inbred lines characteristics together with their sterile analogues in BC-5, transferred to ANN-1 cytoplasm.

Results obtained show that the sterile analogues of lines 1734, 2860 and 3230, are considerably lower-stemmed in comparison with the initial lines. The difference has been mathematically proved.

The 3230 and 3894 CMS-ANN-1 lines gave statistically lower yield compared to that of the lines with normal cytoplasm.

As far as the other characters are concerned(head diameter, leaf number and oil content in the seeds),sterile analogues do not essentially differ from the initial lines.

TABLE 1
Characteristic of 8 sunflower self-pollinated lines and their sterile analogues (CMS-ANN-1)

Lines	Plant height (cm)	Head diameter (cm)	Leaf number	Seed yield per plant (g)	Oil content in the seeds (%)
1234 A	146.2	17.3	28.7	52.5	44.3
1234 B	148.6	18.6	28.5	50.8	45.6
1734 A	129.2 ⁺	20.3	27.9	47.6	44.6
1734 B	136.3	17.9	27.5	47.8	43.8
2184 A	135.8	19.5	20.5	54.8	43.6
2184 B	138.4	19.9	19.5	54.6	55.6
2860 A	149.5 ⁺	22.8	23.7	54.8	44.1
2860 B	156.2	22.5	22.5	53.3	45.2
2759 A	110.6	20.7	22.3	49.9	43.7
2759 B	109.5	18.7	19.5	48.6	45.8
3004 A	122.7	17.3	25.6	59.6	43.1
3004 B	120.5	16.9	26.3	57.8	43.6
3230 A	127.8 ⁺	22.8	25.7	44.6 ⁺	44.6
3230 B	136.8	21.1	23.0	50.8	45.1
3894 A	147.4	18.6	23.2	51.2 ⁺	43.7
3894 B	151.6	20.1	24.7	57.2	43.1

LSD:P=0,05

1234 A - CMS analogue

1234 B - line

Lines 2184, 2860 and 2759 transferred to ANT-1 cytoplasm are lower-stemmed and with a bigger head diameter in comparison with the original lines (table 2).

TABLE 2
Characteristic of 8 sunflower self-pollinated lines and their sterile analogues (CMS-ANT-1)

Lines analogues	Plant height (cm)	Head diameter (cm)	Leaf number	Seed yield per plant (g)	Oil content in the seeds (%)
1234 A	148.2	17.3	28.2	50.8	45.6
1234 B	146.2	18.7	27.6	52.4	44.3
1734 A	136.2	20.4	27.8	47.6	44.6
1734 B	135.6	17.9	27.5	47.1	43.8
2184 A	137.8 ⁺	22.4 ⁺	27.8	47.6	44.6
2184 B	146.2	17.9	27.5	47.9	43.8
2860 A	149.5 ⁺	22.9 ⁺	22.6	49.9	45.2
2860 B	157.2	18.5	21.9	49.3	44.2
2759 A	112.2 ⁺	22.7 ⁺	22.3	51.6	45.6
2759 B	118.2	18.4	21.9	49.5	43.7
3004 A	122.8	17.5	25.6	57.6	43.6
3004 B	123.8	16.9	23.9	59.7	43.2
3230 A	141.1	23.7	25.7	52.6	44.6
3230 B	143.2	23.1	23.1	53.9	45.9
3894 A	147.2	20.2	23.2	56.2	43.6
3894 B	151.1	18.6	24.6	57.3	43.4

LSD: P=0,05

1234 A - CMS analogue

1234 B - line

The difference has been statistically proved.

No difference in either positive or negative aspect has been observed regarding leaf number, seed yield and oil content.

Table 3 presents results concerning the effect of PET-2 cytoplasm. It shows that the new CMS source does not affect the sunflower characters tested. As far as all five characters (plant height, head diameter, leaf number, seed yield per plant and oil content in the seed) are concerned, no proved difference between sterile analogues of PET-2 cytoplasm and the initial lines of normal cytoplasm has been noted. These experimental results have been proved throughout the 3 year period of research work.

TABLE 3
Characteristic of 8 sunflower self-pollinated lines and their sterile analogues (CMS-PET-2)

Lines	Plant height (cm)	Head diameter (cm)	Leaf number	Seed yield per plant (g)	Oil content in the seeds (%)
1234AA	146.4	17.3	26.2	53.5	44.3
1234 B	148.2	18.7	26.7	52.6	45.9
1734 A	136.2	20.3	27.9	48.6	44.7
1734 B	138.1	19.4	27.5	49.1	43.8
2184 A	135.8	19.9	20.7	54.7	43.6
2184 B	137.2	20.1	19.8	53.1	45.7
2860 A	156.2	22.6	23.2	55.1	44.1
2860 B	154.3	20.7	24.3	56.1	45.2
2759 A	110.7	20.7	22.4	51.1	45.8
2759 B	109.5	18.6	21.6	53.6	44.1
3004 A	122.7	18.4	25.7	57.6	43.2
3004 B	120.9	18.9	23.1	59.5	43.9
3230 A	137.3	22.8	25.6	52.1	44.9
3230 B	140.1	21.2	27.8	53.6	45.2
3894 A	151.6	18.9	23.8	58.2	43.9
3894 B	152.8	20.1	24.7	57.3	43.6

LSD: P=0,05

1234 A - CMS analogue

1234 B - line

CONCLUSIONS

1. PET-2 cytoplasm has no depressive effect on the biological and economical characters and can therefore be successfully used in hybrid sunflower production.

2. ANN-1 cytoplasm affects plant height and seed yield from a head and should therefore be used in hybrid sunflower breeding within certain limits.

3. ANT-1 cytoplasm affects plant height and head diameter and can be used in sunflower production within certain limits.