

## COMMERCIAL SUNFLOWER HYBRID EVALUATION IN EAST CENTRAL ITALY

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*Received: October 10, 2006*

*Accepted: May 15, 2007*

### SUMMARY

Sunflower yield is strongly dependent on the cultivar cropped, especially under drought conditions. This study was conducted to determine the best sunflower hybrid to be recommended to farmers. Yield and culture traits response of 13 sunflower hybrids were investigated in Osimo, East Central Italy, for four years.

Based on the four-year average, Barolo had the highest mean yield, 30.8 t/ha, but it was not significantly higher than the other 9 cultivars. Among the best, only one was a high oleic variety (Proleic 204). Gloriasol had a significantly high oil content (530 mg/1000 mg). Oil yield was mainly influenced by achene yield. Differences among the hybrids were large, indicating the need to assist farmers in their cultivar selection.

**Key words:** sunflower, high seed yield, cultivation, high oleic varieties

### INTRODUCTION

Although sunflower is not widespread in Italy, 120 000 ha were cultivated in 2005 and in this year it is estimated that at least in 135000 ha will be planted to sunflower. In central Italy sunflower is planted in up to 50% of the cropped area in a two-year rotation with wheat. To help farmers to use the best sunflower cultivar, the CRA Industrial Crops Institute of Osimo, in conjunction with other partners, annually organize a varietal trial with a specific grant from the Italian Sunflower Seed Association. This paper reports the results from the last four years of trials conducted in Osimo.

### MATERIALS AND METHODS

Many varieties were evaluated in the four years: 46 in 2006; 50 in 2003; 55 in 2004 and 37 in 2005. In each trial common and high oleic varieties were tested.

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There were 16, 27, 28 and 8 high oleic varieties tested in the four years, respectively. The trials were arranged in a completely randomized block design with four replications. Plots were 16.2 m<sup>2</sup> in 6 rows, 50 cm apart. Planting was done with a mechanical planter, putting several seeds per hill and then thinning at 2-4 leaf stage to 5.5 plants/m<sup>2</sup>. Fertilization was done with 92 kg/ha of P<sub>2</sub>O<sub>5</sub> at plowing and 100 kg/ha of nitrogen at planting. Weeds were controlled by incorporating trifluralin plus linuron pre-planting and by hand weeding. Harvesting was done by hand from a 9.48 m<sup>2</sup> area. During the experiments, data on emergence, flowering, maturity, plant height, yield, oil and oleic acid content, thousand-seed weight were recorded. Seed oil content was determined by nuclear magnetic resonance (NMR).

### Weather conditions

In the four years reported, rainfall and temperature were very different (Figure 1).

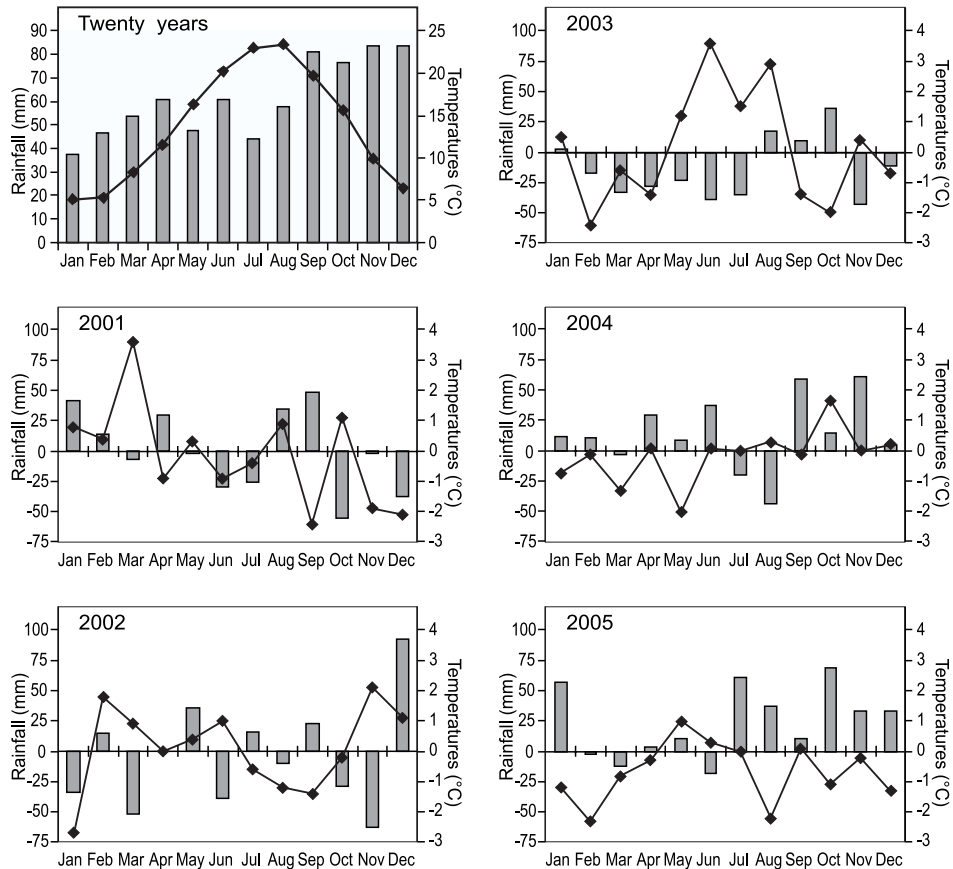


Figure 1: Rainfall (mm) and mean temperatures (°C) of the experimental years compared with the previous twenty-year period.

Rainfall in June was often below average, with the lowest levels in 2003 when the highest deficit occurred. Rainfall significantly influenced crop results.

Temperatures were similar to the 20-year average, with values higher or lower according to low or no rainfall.

## RESULTS

Among the 13 common varieties tested in the four years, Barolo had the highest mean yield, 30.8 t/ha. This yield was not significantly higher than those of the other 9 cultivars (Table 1). Among the best varieties, only one was a high oleic variety (Proleic 204). The remaining three less productive cultivars were all high oleic varieties.

Table 1: Average sunflower yield, composition, phenological and morphological characteristics in a four year trial

Hybrid	Yield 9%		Oil content in DM		Oil yield		1000-seed weight 9% moisture		Emergence-maturity		Plant height	
	t/ha		%		t/ha		g		d		cm	
Barolo	3.08	a	48.0	f	1.35	ac	48.2	b	146	b	154	e
Carnia	2.73	bc	51.5	bc	1.28	c	48.1	b	151	a	160	d
Forte	2.92	ab	49.6	e	1.32	bc	46.4	bc	146	b	152	e
Gamasol	2.63	c	48.3	f	1.16	d	55.3	a	143	c	167	b
Gloriasol	2.91	ab	52.9	a	1.41	ab	42.1	d	143	cd	163	bd
Goleador	2.76	bc	51.1	bd	1.28	cd	38.6	e	143	ce	162	cd
Isar	3.05	a	51.7	b	1.44	a	41.0	de	143	c	162	cd
Panter	2.91	ab	51.5	bc	1.37	ac	41.5	d	136	h	154	e
Paola	2.93	ab	50.8	bd	1.36	ac	46.6	bc	141	ef	164	bd
Proleic 204	2.92	ab	50.4	de	1.34	ac	45.0	c	146	b	162	cd
Sanbro	2.85	ac	48.6	f	1.26	cd	47.0	bc	140	f	173	a
Starsol	2.91	ab	50.7	cd	1.34	ac	41.7	d	138	g	166	bc
Vidoc	2.94	ab	48.4	f	1.31	bc	45.5	c	142	df	173	a
Mean	2.89		50.3		1.32		45.2		143		162	

Ho = high oleic variety

The significantly superior variety for oil content was Gloriasol (530 mg/1000 mg) followed by other 5 varieties of which only two were high oleic. Oil yield was dependent on achene yield. Even if the oil content changed the ranking of the cultivars, the best cultivars for seed yield were also the best for oil yield. The 1000-seed weight values were similar, ranging between 41 and 48 g. Emergence-maturity differed from the extreme period of 136 days to 151 days. The most productive cultivars were medium-early. The later ones were less productive because the weather conditions during the experimental years were very dry. Plant height ranged between 173 and 152 cm and it was not correlated with yield.

## CONCLUSIONS

Over the four-year experimentation period, ten varieties out of thirteen had significantly high seed yields and can be suggested to farmers for cultivation. The recommendation is based on seed yield alone because in Italy payment for sunflower achenes is not based on oil content. Among the best cultivars only one was a high oleic variety indicating that conventional cultivars are still the best. High oleic varieties may be recommended to farmers only when they are better paid.

## ACKNOWLEDGMENTS

*The authors thank Ms Lorella Mangoni for help in recording data.*

## **VALORACIÓN DE HÍBRIDOS COMERCIALES DE GIRASOL EN ITALIA CENTRAL-ORIENTAL**

### RESUMEN

El rendimiento de girasol depende mucho de la variedad que se cultiva, especialmente en las condiciones de sequía. Esta investigación fue emprendida para determinar cuál es el mejor híbrido que debe ser recomendado a los productores. El rendimiento y las características de producción de 13 híbridos de girasol, fue investigado en Osimo, Italia oriental-central, durante cuatro años.

Sobre la base del promedio de cuatro años, Barolo tuvo el rendimiento promedio más alto, 30.8 t/ha, pero éste no era significativamente más alto del rendimiento de otros nueve híbridos. En el grupo de los mejores, hubo sólo una variedad alto oleica (Proleic 204). Gloriasol tuvo significativamente alto contenido de aceite (530 mg/1000 mg). El rendimiento de aceite fue mayormente bajo la influencia del rendimiento de la semilla. Las diferencias entre híbridos eran grandes, lo que indica la necesidad de ayudar a los productores en el momento de elección de híbridos.

## **ÉVALUATION DES HYBRIDES COMMERCIAUX DE TOURNESOL EN ITALIE DU CENTRE-EST**

### RÉSUMÉ

Le rendement du tournesol dépend fortement des cultivars, surtout dans des conditions de sécheresse. Cette étude a été entreprise dans le but d'établir les meilleurs hybrides à recommander aux producteurs. Le rendement et les caractéristiques de production de 13 hybrides de tournesol ont été examinés à Osimo, en Italie du centre-est au cours de quatre ans.

Sur une moyenne de quatre ans, Barolo a eu le plus grand rendement moyen, 30,8t/ha mais celui-ci n'était pas significativement plus élevé que le rendement des neufs autres hybrides. Dans le groupe des meilleurs, il n'y avait qu'une sorte à haute teneur oléique (Proleic 204). Gloriasol avait un contenu d'huile significativement élevé (530 mg/1000 mg). Le rendement d'huile était généralement sous l'influence du rendement des graines. Les différences entre les hybrides étaient importantes, ce qui indique qu'il faut aider les producteurs au moment du choix des hybrides.