

COMMERCIAL SUNFLOWER HYBRID EVALUATION IN EAST CENTRAL ITALY

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Abstract

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 suggested 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 higher 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.

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 organise a varietal trial with a specific grant from the Italian Sunflower Seed Association. In this paper we report 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. 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 m² in 6 rows, 50 cm apart. Planting was done with a mechanical planter putting more seeds per hill and then thinning at 2-4 leaf stage to 5.5 plants/ m². Fertilisation was done with 92 kg/ha of P₂O₅ at ploughing 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 on a 9.48 m² 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).

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

| Hybrid | Yield 9% moisture t/ha | Oil Content on DM. % | Oil yield t/ha | Thousand -seed Weight 9% moisture g | Emergen- maturity d | Plant height 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.

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

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

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 thousand-seed weight values were very similar and ranged between of 41-48 g. Emergence-maturity differed from the extreme being 13 days and the most productive cultivars were medium-early. The later ones was less productive because the weather conditions during the experimental years were very dry. Plant height ranged between 173 and 152 cm and were not correlated with yield.

Conclusions

Over a four-year experimentation period ten varieties out of thirteen, were significantly better for seed yield and can be suggested to farmers for cultivation. The suggestion is based on seed yield alone because in Italy payment is not based on the oil content. Among the best cultivars only one was a high oleic variety indicating that conventional cultivars are still the best; The other should be suggested only if the farmer is paid a little more.

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