

Sunflower plant population effect on seed, oil and protein yield.



By GE Henshaw, North-West Department of Agriculture and Rural Development

Introduction

The production of sunflower is mainly used for oil production and animal nutrition. The amount of seed (oil and protein) produced will be the main factor that concerns the farmer and end user, thus the value and price that can be realised.

Aim

What effect does plant population (row width and in row spacing) and cultivar type have on the seed, oil, and protein yields achieved?

Methods and Materials

The trial was conducted as Potchefstroom research site, on a Bainsvlei soil, with three row widths (45cm, 90cm and 180cm), three plant population rates (15 000, 30 000 and 45 000 plants per hectare) and three cultivar types (dwarf, semi-dwarf and giant). The trial was planted for four years. Various measurements were taken including the plant height, stem diameter, topping of plants, head diameter, two hundred seed mass, number of seeds per head, hectolitre mass, seed, oil and protein yields per hectare.

Plant height, Stem diameter, head diameter, two hundred seed mass, number of seeds per head, seed yield, oil and protein yields were measured. Hectolitre mass was determined as well protein and oil content of the seed.

Results and Discussions

Topping of plants caused lower seed yields and increased significantly with wider row spacing (180 cm) and high plant density (45 000 plants ha⁻¹), lowering the yield to be obtained per treatment. Plant height played an important role in topping, which was more significant in the giant cultivar than the shorter cultivars. To reduce topping medium high cultivars should be planted.

The highest seed yield was obtained with the 30 000 plants ha⁻¹. The seed yield of the 15 000 plants ha⁻¹ was significantly lower than that of the other populations.

The 180cm row constantly produced the lowest seed yield. The other two row widths, 45cm and 90cm, did not differ significantly.

To ensure a high oil and protein yield, it is more important to plant the correct cultivar and at the spacing producing the highest seed yield, rather than emphasis on oil and protein content of the cultivar.

No definite tendency was observed between the optimum plant population for the three different cultivar types (Dwarf, intermediate or giant). The giant cultivar had a higher topping rate as the plant density increased. Thus giant cultivars are not recommended for dry land production conditions.

Conclusion

From the results and a practical point of view, it is recommended that sunflower be established in 90cm rows and 30 000 plants ha⁻¹ under dry land conditions in the Potchefstroom area.

References

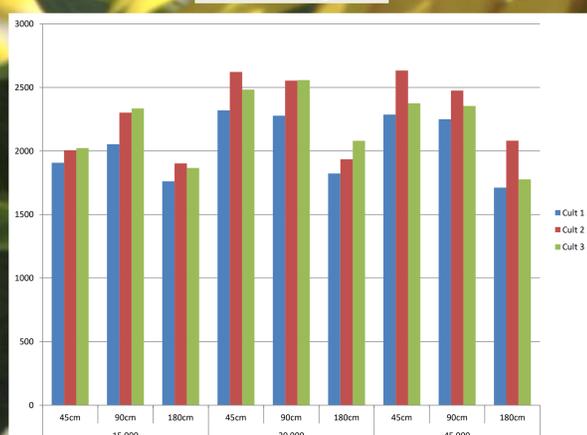
Birch, E.B. & Van Der Sandt J.C., 1985. Optimum plant population for sunflower. *Oilseeds News, September, 20-21*

Gubbles, G.H. & Dedio, W., 1986. Effect of plant density and agronomic performance of sunflower on dryland genotypes. *Can J. Plant Sci.* 64, 599-605.

Khalifa, F.M., 1984. Effect of row spacing on growth yield of sunflower (*Helianthus annuus* L.) under two systems of dry land farming in Sudan. *J. Agric. Sci. Camb.* 97, 45-53

Miller, B.C., Oplinger, E.S., Rand R., Peters, J. & Weiss, G., 1984. Effect of plant population on sunflower performance. *Agron. J.* 76, 511-515.

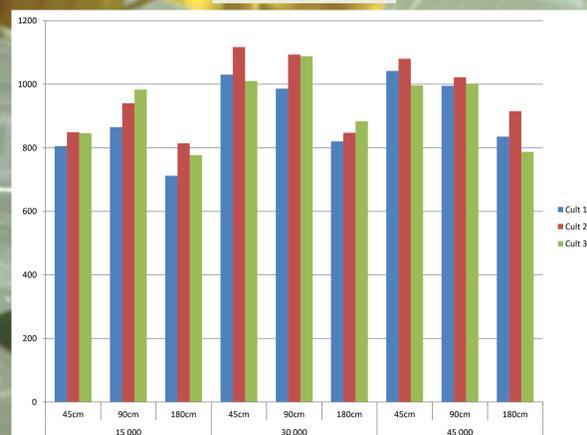
Seed Yield Kg ha⁻¹



The influence of cultivar, plant population and row width on the average seed yield over the four seasons.

SSD T (0,05) Year = 71,63
SSD T (0,05) Cult, Pop, Row = 61,12
SSD T (0,05) Cult X Pop, Pop X Row = 141,44
SSD T (0,05) Cult X Row, Cult X Pop X Row = No Significant difference

Oil Yield Kg ha⁻¹



The influence of cultivar and plant population on the average seed yield for the seasons and the influence of plant population and row width on the seed yield for the seasons.

SSD T (0,05) Cult X Year, Pop X Year, Row X Year = 162,62
SSD T (0,05) Cult X Pop X Year, Pop X Row X Year = 315,51
SSD T (0,05) Cult X Row X Year = No Significant difference

Protein Yield Kg ha⁻¹

