Disease control

The most serious diseases of sunflower are caused by fungi. The major diseases include rust, downy mildew, verticillium wilt, sclerotinia stalk and head rot, phoma black stem and leaf spot. The use of the registered chemicals is recommended.

Other disease control mechanisms

Crop rotation, conservation tillage, scheduled irrigation and the use of disease resistant cultivars.

Harvest maturity and methods

Harvesting should commence as soon as 80 % of the sunflower heads are brown in order to minimise losses caused by birds, lodging and shattering. The leaves turn yellowish during harvesting maturity. The sunflower plant is physiologically mature when the back of the head has turned from green yellow and the bracts are turning brown, about 30 to 45 days after bloom, and seed moisture is about 35 %. The total growing period (from seeding to harvesting) for sunflower ranges from 125 to 130 days. Harvesting is done either manually or mechanically. Manual harvesting is practised by cutting the crop with a sickle or knife. Commercially available sunflower headers are useful in decreasing loss of seed as the crop is direct combined. The combine harvester is used to perform several operations such as cutting the crop, separating the grain from the straw, cleaning the grain from chaff and transporting grains to the storage tank.

Uses

Human uses: It can be used as edible oil in form of margarine, salad dressing oil cooking oil and as snacks.

Animal feed: The nondehusked or partly dehusked sunflower meal can be used for ruminant animals, pig rations, poultry feeds and for silage.

Industrial uses: It can be used in certain paints, varnishes, plastics, in the manufacturing of soaps and detergents. Other industrial uses include production of agrichemicals, use as pesticides, surfactants, adhesives, fabric softeners, lubricants and coatings. A future high potential use will be on diesel engines hence the world is striving for a nonpolluted environment.

Acknowledgements

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2009
Printed and published by:
Department of Agriculture, Forestry and Fisheries
Obtainable from:
Resource Centre
Directorate Agricultural Information Services
Private Bag X144
Pretoria
0001

Sunflower

Scientific name: *Helianthus annus* L
Other names: Sonneblom, Bhekilanga

Background

Sunflower (*Helianthus annus* L.) is one of the few crop species that originated in North America, even though other reports suggest the Fertile Crescent, Asia, South or Central America. It was probably a “camp flower” of several of the western Native American tribes (North American Indians) who domesticated the crop (possibly 1000 BC) and then carried it eastward and southward of North America. The first Europeans observed sunflower cultivation in many places from southern Canada to Mexico and Spain. Sunflower was probably first introduced to Europe through Spain, and spread through Europe until it reached Russia where it was readily adapted. Selection for high oil in Russia began in 1860

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and was largely responsible for increasing oil content from 28 % to almost 50 %. The high-oil lines from Russia were reintroduced into the United States after World War II, which rekindled interest in the crop.

Production areas

Province	District
North West	Dr Ruth Segomotsi Mompati, Dr Kenneth Kaunda, Ngaka Modiri Malema, Bojanala
Free State	Motheo, Lejweleputswa, Mofutsanyane,
Limpopo	Capricorn, Waterberg
Mpumalanga	Gert Sibande, Nkangala, Ehlanzeni

Agronomic requirements

Soil requirements

Sunflower grows in a wide range of fertile soil types; sandy loam to clays with pH value ranging from 6,0 to 7,5. Sunflower has low salt tolerance. Good soil drainage is required for sunflower production, but this crop does not differ substantially from other field crops in flooding tolerance. Soils with a good water holding capacity (clays) will be preferred under dryland conditions.

Climatic requirements

It is tolerant of both low and high temperatures but more tolerant to low temperatures. The crop is particularly sensitive to high soil temperature during emergence. Sunflower seeds germinate at 5 °C, but temperatures of at least 14 to 21 °C are required for satisfactory germination. The optimum temperature for growth is 23 to 28 °C, but a wider range of temperatures up to 34 °C show little negative effect on productivity. Extremely high temperatures have been shown to lower oil percentage, reduce seed fill and germination.

Rainfall

Rainfall requirements range from 500 to 1000 mm. The crop performs well under drought conditions as compared to other crops. However, the crop is not considered highly drought tolerant, but often produces satisfactory results while other crops are damaged during a drought.

Cultural practices

Propagation

Sunflower is propagated by seed.

Soil preparation

Soil preparation should be focused on decreasing runoff, especially in the case of soils with a low infiltration rate. These losses can be limited to a great extent by applying the correct soil cultivation practices. Mouldboard plowing or chisel plowing are the conventional systems of seedbed preparation used to invert residue and several secondary field operations. Conventional systems have been shown to increase the availability and improve the distribution of potassium and nitrogen and to increase the seed zone temperatures.

Planting

The planting density for sunflower ranges from 25 000 to 35 000 plants per hectare, depending on the yield potential of the area. Row width can range from 90 to 100 cm, however, wider rows can also be used, particularly to accommodate other managerial aspects of crop production. The required spacing in the row is about 30 cm at seed depth of 5 to 8 cm. In South Africa, sunflower is planted from the beginning of November until the end of December in the eastern areas and until mid-January in the western areas.

Fertilisation

The soil should be sampled correctly, well ahead of planting, and analysed to obtain a reliable indication of the soil fertility status. Research has shown that sunflower responds to N, P and K. As with other nonleguminous grain crops, nitrogen is usually the first limiting factor for yield. Yield increases of N fertiliser rates to >120 kg/ha have been observed, but rates considerably lower than this are usually recommended, especially under dryland farming. Low nitrogen applications should be made in soils with a high amount of nitrogen. Nitrogen can be supplied from mineral or nonmineral sources (manures, legumes, compost). Row placement of P and K may be important in sunflower for maximising efficiency of fertilisers use, as it is with many species. Fertiliser application should be based on recommendations subsequent to soil sampling.

Irrigation

In most cases, the sunflower in South Africa is cultivated under dryland during the summer rainfall season (November to March). In areas with low rainfall, irrigation can be supplemented in order to increase yield. The method of irrigation will depend on the water availability and the available irrigation equipments. The pH of the irrigation water should be slightly neutral.

Weed control

Early season weed control is essential for good yields. Successful weed control should include a combination of cultural (mulching, rotation, intercropping, use of cover crop, deep tillage) and chemical methods. Post-emergence cultivation with a coilspring harrow, spike tooth harrow or rotary hoe is possible with as little as 5 to 7 % stand loss when sunflowers are at the four to six leaf stage (beyond cotyledon), preferably on dry afternoons when the plants are less turgid. Common weeds in sunflower include: Annual (purple and yellow nutsedge) and perennial grasses, and broad-leaved weeds. Registered chemicals are recommended.

Pest control

Insect pests have become major potential yield-reducing factors in sunflower-producing areas. These potential risks require that growers follow integrated pest management (IPM) practices. Resistance to insects can be improved by the presence of a dark coloured “armor” layer on the seed coats. Resistance to midge has been suggested but is not currently effective. Only currently approved insecticides should be used for control of insects. Birds can be major pests in sunflowers; especially the blackbird, goldfinch, dove, grosbeak and sparrow. Many approaches to disruption of feeding have been tried, including scarecrows, fright owls, aluminum strips that flutter in the wind and carbide exploders. Only registered pesticides are recommended. Cultural control measures include: Crop rotation, growing resistant cultivars and using of certified seeds.