Fertilization

Fertilizer requirement under irrigation for hay production:
100 kg N per hectare is recommended, with an additional 25 to 50 kg/ha after each grazing and/or fodder harvest, depending on level of production. For grain production, the general recommendation per hectare is 90 kg N, 25 kg P and 20 kg K for a grain yield potential of 4,5 t/ha. Under dry- land conditions in the high-rainfall regions, the recommendation per hectare is 40 kg N, 10 kg P and 10 kg K (optional). A maximum of 20 kg N per hectare or a total of 50 kg N+K per hectare can be seed-placed safely, and higher applications must be band-placed away from the seed.

Weed control

Broadleaf weeds can be controlled easily with the recommended quantities of appropriate herbicides. There are various herbicides registered for the control of broadleaf weeds. Some of these herbicides are registered only for use in the winter rainfall area. It is important always to refer to: Department of Agriculture, Forestry and Fisheries' "A guide to the use of herbicides," to check if a certain herbicide is registered for use on oats. Smaller weeds are easier to control than bigger weeds; however, the recommended leaf stage for herbicide application must always be taken into consideration. Always use the proper crop rotations and cultural strategies to ensure that the crop is planted on fields free of these weeds.

Disease control

Oats is susceptible to crown and stem rust and to "barley yellow dwarf virus," which is spread by aphid infestations. It is economically viable to control diseases at all stages of growth and development for yield potential levels above 4 t/ha. Diseases generally lower the kernel weight and hectolitre mass, leading to grain discolouration. Foliar fungicides application at the seven-leaf stage and again at flag-leaf stages can control these diseases.

Harvesting method and marturity

Oats can be harvested at grain moisture content below 20 % but can only be stored safely at grain moisture below 12,5 and 14%. Normally a commercial harvester is used to harvest the crop, especially when a large number of hectares have been planted. The table of the harvester can vary from 3 to 10 m, depending on the area planted. To obtain a higher quality, dehulled kernels must be avoided. This may involve slower cylinder speed and wider concave clearances. Hull-less oats is vulnerable to damage. Thresher cylinder speed should be reduced to approximately 900 rpm (revolutions per minute) and the concaves should be carefully adjusted to avoid damage. Plot harvesters/combines are used for trials with small plots. Very small areas are harvested in the traditional way, that is, with the use of sickles.

Crop utilisation

Human consumption: For human consumption, oats is among the nutritious cereals, high in protein and fibre. The protein of rolled oats is generally greater than that of other cereals. Food uses include oat meal, oat flour, oat bran and oat flakes.

Animal feeding: Oats can be used for livestock as forage, fodder, straw, bedding, hay, silage and chaff.
Industrial purposes: Furfural which is used as a main solvent in processing and refining vegetable oil is derived from the pulverised oat hulls. Oat hulls are also used to manufacture adhesive chemicals, abrasives, filters and pharmaceutical as well as cosmetic products.

Agronomic purposes: Oats is a significant contributor to sustainable agriculture as it can be used as a natural herbicide, fertilizer, mulch and biomass, groundcover and to control erosion.

Acknowledgements

Agricultural Research Council-Small Grain Institute

Further information can be obtained from:
Directorate: Plant Production
Private Bag X250, PRETORIA 0001
Tel: +27 12 319 6072, Fax: +27 12 319 6372
E-mail: DPP@daff.gov.za

Oats

agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Oats

Scientific name: Avena sativa
Family: *Gramineae*
South African common name: Oats (English), Hawer (Afrikaans), Habore (Sesotho)

Background

It is not well known where or when the common cultivated oats originated from but it is believed to be mainly of Asiatic origin. Different kinds of oats probably came from various parts of that continent or Europe. Cultivation of oats was extensive in Europe prior to the discovery of America and the earliest settlers brought the seed to the new world. It is found in the fields under continuous small grain cropping in North Dakota, South Dakota, Minnesota and Montana. It is also found through out the United States, except in the southeast (Alabama, Florida, Georgia, Kentucky, the Carolinas, Mississippi, Arkansas, Tennessee and West Virginia) and the Delmarva Peninsula. Owing to its wide planting spectrum and adaptability as well as high biomass production, oats is suitable for almost all regions of South Africa.

South African Production Areas

Province District

Free State Lejweleputswa, Thabo Mofutsanyane, Fezile Dabi, Xhariep
Western Cape West Coast, Cape Winelands
North West Dr Ruth Segomotsi Mompati, Bojanala
Northern Cape Frances Baard
Mpumalanga Gert Sibande
Limpopo Waterberg

Climatic requirements

Temperature

Oats in the germinating, seedling and vegetative stages, is not sensitive to low temperatures and frost. It requires very low soil temperatures (3 to 4 °C) for at least 10 days to 8 weeks for vernalisation and to reach tillering potential. Small grain crops, such as oats, are sensitive to frost in the reproductive stage (when the growth points are above ground) or after ear emergence. Frost during this time (usually in September and October) can cause severe damage to the crop. Oats can also be damaged by dry, warm periods. During drought conditions, heat stress is experienced and is usually associated with high temperatures as well as warm and dry winds. Heat stress can be particularly damaging during the flowering stage of the plant.

Rainfall

Oats, as a small grain crop, needs good moisture conservation or 300 mm rainfall during winter, spring and early summer (growth period). It is important that water be provided to the crop during this period. In the winter rainfall region of South Africa (e.g. Western Cape Province) sufficient rainfall is usually received during the winter months to provide in the water needs of the crop. In other regions, very little rain is received during winter.

Soil requirements

Although the crop is widely adapted to moist soil conditions, generally it has similar soil requirements to wheat regarding both macronutrients and micronutrients that have a major influence on production. Soil acidity levels of pH 4, 8 to 5, 5 (KCL) are regarded as optimal. Oats is more acid tolerant (up to 15% acid saturation) than wheat, but less saline tolerant than wheat and barley.

Cultivar selection

The choice of cultivar by producer depends mostly on the end-market for production. There are few registered cultivars of oats in South Africa; some are suitable for grain, grazing, silage and other for hay production. The following aspects should be taken into consideration when selecting a cultivar for a specific area: weather conditions, yield potential, maturity, disease resistance; straw strength, resistance to shattering, grain quality and plant height.
Some registered cultivars are listed below in the table:

Oats cultivars		
Overberg	Sederberg	Kompasberg
Potoroo	SSH 491[2]	SSH 405[2]
SSH 39W[2]	SWK 001	Le Tucana
Heros	Witteberg	Pallinup
SSH 421[2]	Drakensberg	Maluti
Perdeberg	Potberg	Wandering

NB: Farmers must always consider latest registered cultivars before planting and have to constantly bear in mind that cultivars may change annually owing to ongoing research.

Production practices

Soil preparation

Irrespective of the crop rotation system followed, the main aim is to accumulate the maximum quantity of soil water, alleviate compacted soil layers and prepare a seedbed that will ensure good germination and seedling establishment. In general, oats requires a well-prepared seedbed to ensure optimal emergence and development of the crop. The seedbed can be prepared by conventional tillage methods where the field is worked with various implements prior to planting. Conservation tillage methods aim to retain stubble on the soil surface and the soil is not ploughed.

Planting

Preceding the planting of oats, the standard seed treatments against seed-borne diseases must be applied in grain production, while it is optional in grazing and hay production. The planting time for oats is from September to October in cooler areas and January to April in warmer areas. The required depth for seeding is 2 to 5 cm. The inter-row spacing (in the row) is about 30 to 100 cm, intra-row spacing (between the rows), depending on farming method. Under irrigation, seed placement is not as critical as moisture from the surface will be available for the germination process. In dry land production areas, seed placement is critical because seed must be placed within the moist soil layer.

Irrigation

Under movable irrigation systems and supplemental irrigation applications, the current recommendation is five irrigations during the growth season if production is started on a full soil profile. These irrigations are applied at the 5-leaf, early stem elongation, flag-leaf, flowering and during the grain-filling stages. Irrigation during the later growth stages tends to disrupt uniform ripening, thereby delaying harvesting. Oats is susceptible to water stress during grain filling and this necessitates well-timed and effective soil water management.