

Control

A good standard of phyto-sanitation in nurseries is the first step in nematode control. Tea producers are advised to fumigate the soil using recommended chemicals. Water used in the nursery should preferably come from a primary source such as a borehole or a spring.

Disease control

Diseases affect the aerial parts, especially the roots of tea, which is partially susceptible to root rots.

Root diseases

Root diseases occur especially where tea has been planted after forest clearing. They destroy the roots, thereby restricting the intake of water and nutrients. Growth is disrupted, the foliage wilts and the plants die.

Armillaria root rot

This is caused by a fungus, *Armillaria mellea*, and the disease can be recognised by the appearance of longitudinal and radial cracks at the collar, the base of the trunk and in the roots. Found between the bark and the wood and around the roots, the fungus develops thick, white, palmate patches that are easily detachable. Sometimes, the fungus produces black rhizomorphs which may spread through the soil.

Collar rot

This is caused by *Rosellinia* spp., is very much localised and limited to only a few plants. This fungus produces a white to grey mycelial veil on the surface of the collar and turns dark grey to black as it ages. On the roots, the fungus has the same appearance, but with a white border and loose masses of black hyphae. Tea reacts to this rot by a proliferation of bark at collar level and the formation of many adventitious roots.

Charcoal rot

Caused by fungus *Ustilina deusta*, which develops under the bark as a whitish growth. The wood becomes covered in fine blackish double lines. At a more advanced stage, thin and flat toadstools appear on the collar or the trunk.

Root rot are difficult to control and only preventive measures and phytosanitary rounds can avoid infection. When the land is being cleared, the trees must be uprooted and removed from the field together with all their roots. They are uprooted, complete with taproot and lateral roots, as should their immediate neighbours, and burned outside the field. The uprooted areas are then planted with Guatemala grass (*Tripsacum laxum*) before being replanted with rooted cuttings.

Trunk and branch diseases

Trunk and branch canker, caused by *Phomopsis theae*, is usually rampant after a prolonged drought and affects young clonal tea plants that are susceptible to this disease. The bark is gradually destroyed and a callus forms. The successive pruning of tea favours the development of branch diseases. These diseases reduce the vitality of the frame and lead to a fall in yield.

Pink disease occurs on tea, particularly in very humid regions. It is caused by *Pellicularia salmonicolor* (*Corticium salmonicolor*). The inside of the branch bark becomes covered in a white-pinkish mycelial crust and the bark cracks. Affected branches gradually dry up and the leaves turn yellow and fall. In addition, the branched often have cankers.

Control

Disease control is by spraying with a recommended chemical. Cultural practices, which contribute towards reducing water stress, will limit the development of the disease. It is also advisable to cut damaged branches and trunks and to burn them.

10. CAMELLIA DIEBACK AND CANKER

Glomerella cingulata

Symptoms

Leaves suddenly turning yellow and wilting, branch tips dying, gray blotches on bark and

stem which develop into sunken areas (cankers), cankers girdling the stem, parts of plant above cankers losing vigour, wilting and dying, symptoms more pronounced during hot, dry weather.

Control

Plant in well-draining, acidic soils; remove diseased twigs by cutting several inches below cankered areas and disinfecting tools between cuts, apply appropriate protective fungicides during periods of wet weather or natural leaf drop to protect leaf scars from infection.

Harvest maturity

Camellia plants usually have a rapid growth rate. Typically they will grow about 30 cm per year until mature, although this does vary depending on their variety and geographical location. It could take a full two to three years from germination until a plant has fully matured and capable of producing tea to drink. Once a tea plant has reached maturity, its leaves can be harvested for many years.

Harvesting methods

Hand picking

Tea shrubs in production are selectively picked by hand. The best quality dry tea is obtained by fine picking (tip leaf or "pe-koe" plus two young leaves). This hand picking is repeated every one to two weeks. Tea plants are picked by hand by grasping the plant between thumb and forefinger, so as not to damage the plant. The leaves should be large enough, but not too old for them to be picked. Just the top two leaves and the bud are picked for the best black teas.

Machine picking

Machine picking is not selective. The quality of the end product is nevertheless acceptable and can be improved by making adjustments to the processing plant and by planting better cultivars.



11. UTILISATION

The aged leaves and stems are used to make medicine. Black tea is used for improving mental alertness as well as learning, memory and information processing skills. It is also used for treating headache and low blood pressure; preventing heart disease, including "hardening of the arteries" (atherosclerosis) and heart attacks; preventing Parkinson's disease and reducing the risk of stomach and colon cancer, lung cancer, ovarian cancer, and breast cancer. It is also used for type 2 diabetes, stomach disorders, vomiting, diarrhoea, and as a diuretic to increase urine flow. Some people use black tea for preventing tooth decay and kidney stones. In combination with various other products, black tea is used for weight loss.

In foods, black tea is consumed as a hot or cold beverage. Dried and cured leaves are used widely as beverage, which has a stimulant effect because of caffeine. The seeds can be used to make tea oil.

12. REFERENCE

https://en.wikipedia.org/wiki/Black_tea, 12 November 2015.
Black tea". Medline Plus, US National Library of Medicine. 2015, 15 March 2015.
<http://worldteanews.com/news/global-black-tea-production-declines#sthash.BZCZzf0.dpuf>, 25 August 2014.

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Black Tea



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1. NAMES

Botanical name: *Camellia sinensis*
Common names: Tea plant

There are four types of teas namely: Black tea, Oolong tea, green tea and white tea and all four types are made from leaves of the shrub (or small tree) called *Camellia sinensis*. Two principal varieties of the species used are the small-leaved Chinese variety plant (*C. sinensis* subsp. *sinensis*), used for most other types of teas, and the large-leaved Assamese plant (*C. sinensis* subsp. *assamica*), which was traditionally mainly used for black tea, although in recent years, some green and white teas have been produced.

Black tea is a type of tea that is more oxidised than oolong, green and white teas and it is generally stronger in flavour than the less oxidized teas. Black tea retains its flavour for several years and has a longer shelf life compared to other teas. For this reason, it is the world's most popular and traded variety.

Camellia is a genus of flowering plants in the family Theaceae. Teas originated in China, where they are known as red tea, but now come from many growing regions throughout the world. South Asia, along with China and Kenya, produce the majority of the black tea globally. In South Africa black tea is found in Limpopo (Vhembe region), KwaZulu-Natal (Nkandla), Eastern Cape (Lusikisiki) and Mpumalanga (Noordkaapriver) provinces.

3. DESCRIPTION

Camellia sinensis is an evergreen plant which grows mainly in tropical and subtropical climates. A tea plant will grow into a tree of up to 16 m tall if left undisturbed, however; cultivated plants are generally pruned to waist height for ease of plucking. As a cultivated evergreen plant, tea is usually trimmed to below 1,83 m in height. But if left to grow wild, the bush can reach 8,14 m.

Leaves

The leaves are dark green and usually 5 to 10 cm long and 2 to 5 cm wide. The leaves vary considerably in size and shape, according to the variety, but are leathery, alternate and generally elliptical or lanceolate, with a toothed margin.

Flowers

The flowers are white with a yellow Centre; are 2,4 to 4 cm in diameter, with seven or eight petals. The colours of the flowers vary from white through pink colours to red; truly yellow flowers are found only in South China and Vietnam.

Stem

The plant has strong thick yellow stamens which appear solitary, or two or three together on short branchlets in the leaf axils.

Roots

Tea plants from seedlings have a strong taproot with a dense network of feeder roots. Most of feeder roots are located in the top 30 cm of soil. Taproots reach a depth of 1,5 to 3 m and provide good anchorage for plants.

Fruits

The fruits are 2 to 3 cm in diameter, brownish-green in colour when mature and contain 1 to 4 spherical or flattened brown seeds. The fruit ripens in 9 to 12 months, after which the seeds fall to the ground.

4. CLIMATIC REQUIREMENTS

Tea plants grow well in tropical and subtropical climates. Temperature plays an important part in the growth and yield of tea. Average temperatures below 12 to 13 oC and above 30 oC delay the development of the shoots to be harvested. The ideal mean annual temperature is thought to lie between 18 and 20 oC. The hours of sunlight are important and the amount should be at least five hours a day. A relative humidity of 80 to 90 % is favourable during the growth period of tea plants, below 50 %, shoot growth is inhibited and below 40 % growth is affected adversely.

5. SOIL REQUIREMENTS

Tea is grown on a wide range of soils. Tea should be grown in a well-drained, sandy soil that is slightly on the acidic side. Tea shrubs require fertile acidic mountain soil with a pH of around 4,5 to 5,5 which are deep (at least 2 m), well structured, with a high level of minerals and a well-developed humus-containing horizon, red soil with a loamy texture (i.e. a clay content of 20 to 45 %). Dystrophic (highly leached) soils that commonly occur in valleys and areas with a rainfall in excess of 1000 mm per annum are highly suitable for tea. Good

internal drainage is absolutely essential for suitable tea soil. The best, however, is a light; friable loam with porous sub-soil which permits a free percolation of water, for tea is highly intolerant to stagnant water. In general, the most suitable soils are slightly acidic with no calcium. The presence of iron in sub-soil is desirable.

6. PRODUCTION PRACTICE

Soil preparation

Depending on the soil cover (forest or savanna), clearing begins one or two years before the plantation is established. All plants and roots have to be removed to prevent the spread of root rot. The forest or savanna should not be burned as this destroys the humus and impoverishes the soil. Any plant debris can be burned away from the field and the ashes then spread out on the soil.

Before ploughing, perennial weeds have to be eradicated by spraying with recommended herbicide. The soil is ploughed, once or twice to a depth of 20 to 40 cm, using a disc plough or furrow plough or even a hoe or a fork on peasant plantations. It is then harrowed to break up the clods and to level the field.

Propagation

Tea plant is propagated from seed and rooted leaf cuttings. The seeds are relatively easy to grow. Propagation by means of cuttings from selected clones gives better results since vegetable material is true-to-type and will therefore perform exactly like the mother plants, which is not true of seedlings. Cuttings usually consist of a single internode plus one leaf, but they can also consist of two internodes and two leaves. The cuttings root easily and can be transplanted in the field after six to nine months. Leaf cuttings are also used to establish new tea plantations.

Planting

Tea is planted as soon as land preparation is completed. The ideal time to plant *Camellia sinensis* in the garden is in early fall or spring, but summer time is good enough if the plants are kept moist. In general, planting is completed by end-May/June in draughty areas and by September to early November in other places.

Plantings should be established in single rows, which are 1,50 x 1,75 m apart. Seedlings of around six to twelve months old may be transplanted with a ball of earth, while much older seedlings can be planted bare-rooted, cutting the stem 10 cm from the soil level. Seedlings can be planted 1,2 m apart in a sunny to partially shaded spot in sandy soil with a pH of 5 to 6. Single-internode cuttings, should be cut above a node with an axillary bud, inserted in the soil at an angle so that the subtending leaf rests on the medium, take well. Hedge plantings in rows about 1,5 m apart spaced 60 cm apart in the row give better initial yields and may facilitate mechanical harvesting.

Fertilisation

The quantity of fertiliser to be applied will depend on the age and yield of the tea plants, as well as on soil fertility and soil analytical report. During the first five to six years of growth, tea plants need 40 to 200kg/ha/year of N. Application of P and K is given at 50 % of the amount of phosphate. The plants should be fertilised just as new foliage growth begins to emerge in spring, and again in early summer using a commercial fertiliser that is recommended as suitable for camellias. The plants should be always well watered before applying fertiliser and dry plant should not be fertilised. Tea plants should not be fertilised during the winter months. Mulch is applied around the bushes to encourage healthy growth, and in the spring feed the plants with a controlled-release fertiliser. Tea plantations are usually fertilised two to three times per year.

Irrigation

The amount of water required should be decided in relation to the water deficiency and calculated case-to-case based on the soil's effective reserves and evapotranspiration. Mostly, the sprinkler does irrigation which leads to an appreciable increase in tea production. Regular irrigation will encourage new growth.

Weed control

To combat weeds, a number of techniques have been put into practice on tea plantations. The most direct is clean weeding either by hand or cultivation implementation. This usually involves carrying the weeds off the land and burning them, because an uprooted weed can either re-establish itself in rainy weather, or ripen and disseminate its seed in dry intervals. Weeding should be done by hand until the canopy closes and shades out weeds. All perennial weeds should be removed.



Pest control

Damage by various organisms, few mites and insect species to the tea plants have already been observed in South Africa.

7. MITES

These creatures are very small and can usually only be seen under a hand lens or a magnifying glass.

Red spider mite (*Oligonychus Coffeae*)

Symptoms

These mites attack the foliage in the hot dry season. The larvae and adult spiders feed on the upper surface of well-developed leaves. Infested leaves are, at first, reddish in colour and then turn bronze or coppery-brown as the attack spreads; finally, they wither and drop. In heavily infested fields, the maintenance foliage is sparse and there is an appreciable loss in yield. Periods of dry heat are favourable to the egg-laying and development of the red spider mite.

Control

Several heavy showers will eradicate the infestations. Spraying with recommended pesticides is useful, to be effective, spraying should begin as soon as the first symptoms appear.

Scarlet mite (*Brevipalpus sp.*)

Symptoms

Feeds on the lower surface of the leaves near the petiole, lead in the event of a prolonged attack, to premature defoliation.

Control

Application of recommended pesticide is an effective control measure, as long as it reaches the underside of the leaves.

8. INSECTS

Mosquito bugs (*Helopeltis schoutedeni* or *H. orophila*)

Symptoms

Mosquito bugs can cause considerable crop losses. The nymphs and adults feed on the leaves and young shoots thereby sucking the sap. Brownish spots appear, leaves and shoots shrivel up, dry and drop.

Control

Spraying with registered chemicals will control mosquito bugs.

Black tea thrips (*Heliothrips haemorrhoidalis*)

Symptoms

Outbreak of black tea thrips are associated with prolonged drought, they suck the cell sap of mature and young leaves. The new leaves remain small, become cupped and the margins are brown and cracked. The growing shoots are stunted with shortened internodes and defoliation often occurs. The underside of the affected leaves become silvery with black spots, the excreta of the insect.

Control

These pests can be controlled by timing the prune so that the tea is fully recovered by the beginning of the thrip season.

9. NEMATODES

Nematode damage is synonymous with tea production in the traditional tea countries abroad. The best-known harmful nematode species in tea are the root-knot nematode (*Meloidogyne incognita*) and the lesion nematode (*Pratylenchus loosi*). The root-knot nematode is wide-spread on numerous crops in South Africa. Both species were found on tea in the area of Thohoyandou, but the exact species has not yet been identified. Spiral nematodes (*Helicotylenchus* spp.) also occur commonly on tea in Thohoyandou.