

Origin and adaptability of kikuyu in terms of soil and climatic requirements

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Origin

Kikuyu originated on deep red, well-drained latosolic soils at forest margins and in grassy glades at an elevation of between 1950 and 2700m in east and central Africa (Ethiopia, Kenya, Tanzania, Uganda and Zaire) (Skerman & Riveros 1090).

Adaptation

Latitudinal limits

27° North and South (but somewhat further south than this in South Africa and down to 34° S in New Zealand (Rumball, 1991).

Altitudinal limits

From sea level to 3 500m (Skerman & Riveros 1090). Turgeon (1980) considers it to be well adapted to elevations above about 1850m in the moist tropics of Mexico and central Africa.

Temperature requirements

Optimum temperatures: the optimum temperature for growth is said to be in the range 16 to 21° C (Russell and Webb, 1976) *i.e.* somewhat lower than most other tropical species.

Response to high temperatures

Kikuyu responds poorly to high temperatures (Russell and Webb, 1976) mainly, perhaps, because of disease problems under such conditions.

Minimum temperatures for growth

These are reported variously as between 2 and 8°C (Mears, 1970) and $7.7 \pm 4^\circ\text{C}$ (Russell and Webb, 1976).

Frost tolerance

Most South Africans would assume that kikuyu is tolerant of heavy frost but reports in the international literature vary quite widely in this respect. Crowder and Chheda (1982) report its frost tolerance as good (the latter mention that while its leaves wither and die in frosty environments, its stolons are unaffected). Turgeon (1980) considers its resistance to freezing conditions to be poor, as do Skerman and Riveros (1990) who maintain that, while its leaves wither and die in frosty environments, its stolons are unaffected. Turgeon (1980) considers its resistance to freezing conditions to be poor, as do Skerman and Riveros (1990) who maintain that, while it will tolerate occasional frost, it is not well adapted to sustained frostiness. Whiteman (1980) reports that it tolerated only moderate levels of frost.

Response to the moisture environment

Dryland rainfall requirement

The rainfall of its natural habitat ranges between 1000 and 1600mm (Mears 1970). Russell and Webb (1976) estimate its rainfall requirement (or, presumably rainfall/irrigation equivalent) to be $1\ 269 \pm 632$ mm whereas Whiteman (1980) regards 850mm to be reasonable for kikuyu.

Drought tolerance

Its drought tolerance in its natural habitat is said to be good because of the deep root system it develops in the deep well drained soils on which it grows. Interestingly, it is claimed that the addition of nitrogen fertilizer increases its drought tolerance (Skerman and Riveros, 1990). Whiteman (1980) regards its drought tolerance as fair. Ukulinga, at about 700mm rainfall per annum, is distinctly marginal, at least on shallow Westleigh soils.

Tolerance of waterlogging

Kikuyu is said to tolerate waterlogging well and to survive periods of submergence of up to 10 days (Dale and Reid, 1975). However, Whiteman (1980) considers its tolerance of waterlogging to be no more than fair.

Soil requirements

Preferred soil conditions

Like most species, kikuyu prefers deep, well-drained, fertile soils of medium texture (Turgeon, 1980; Skerman and Riveros, 1990). It thrives on alluvial soils and in moist sandy soils provided soil fertility is maintained at a reasonable level (Skerman and Riveros, 1990). Perhaps more importantly, it does poorly on shallow, droughty, infertile heavy clays.

Tolerance of salinity

Kikuyu is said to tolerate high salinity levels (Russell, 1976; Skerman and Riveros, 1990) and to tolerate irrigation with saline bore water even on saline soils, provided sufficient water is applied to keep high levels of soil salts at depth (Everist, 1974).

The light environment

Tolerance of shade

The response of kikuyu to shade is shown in Table 1 (Samarakoon *et al.*, 1990). As shown, a number of the characteristics studied were not greatly affected by shade (yield, leaf %, DM digestibility and cell wall content) but daily voluntary intake was greatly reduced by shading. This led to a substantial drop in the daily intake of digestible nutrients. The non-structural carbohydrate concentration of the material was also substantially reduced by shading. Skerman and Riveros (1990) rate the response of kikuyu to shade as poor.

Table 1. Response of kikuyu to shaded conditions (after Samarakoon *et al.*, 1990).

Characteristic	Full sunlight	50% shade
DM yield (t/ha)	8.7	8.4
Leaf (%)	54	48
DM digestibility (%)	50	46
Daily voluntary intake (g/kg LW ^{0.75})	49	34
Daily digestible nutrient intake (g/kg LW ^{0.75})	20	13
Non-structural CHO (%)	2.1	0.9
Cell wall content (%)	73	70

Response to daylight

Kikuyu is reported to be insensitive to changes in day-length.

Fire

Kikuyu is tolerant of fire.

Disease resistance

Kikuyu is sensitive to a number of diseases but these only really become a problem under hot humid tropical lowland conditions (Turgeon, 1980). Among the diseases listed under such conditions is kikuyu yellows which is particularly prevalent in the lowveld regions of Mpumalanga. Apparently this is a Barley Yellow Dwarf Virus (McKirdy and Jones, 1993). High nitrogen levels promote the disease (Skerman and Riveros, 1990).

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