INTREGRATED SOIL FERTILITY MANAGEMENT IN PYRETHRUM FARMING IN KENYA

KALRO
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Introduction

Pyrethrum is a perennial crop with a daisy-like appearance, whose white flowers possess insecticidal properties. It is a tufted, slender and herbaceous plant growing up to an approximate height of one metre. The leaves are alternate and pinnately lobed/narrowly lanceolate to oblong lanceolate. It is cultivated commercially solely for the production of six esters compounds called pyrethrins.

Climate requirements

Climate is a key factor to consider in the area to grow pyrethrum crop successfully. This includes temperature and rainfall requirements at different stages in the crop's growth cycle.

Temperature

Pyrethrum is favoured by cool temperatures. It requires a temperature of less than 18 °C for at least 6 weeks in order to initiate flowering. Temperature influences pyrethrin content; as mean temperature decreases pyrethrin content increases.

Rainfall

Pyrethrum requires a minimum of 750 mm rainfall per annum well distributed over the season. In areas with high evaporation, high rainfall (>1000 mm per annum) well distributed throughout the growing season is preferable.

On the basis of rainfall pyrethrum growing zones can be divided into three major regions in Kenya:

1. Nyanza: wet climate with continuous rainfall.
2. Rift Valley: 1000-1250 mm with clear peaks in April-August and October-December coinciding with low temperatures.
3. Central: 1,000-1500 mm annual rainfall with high peaks between April-May and October-November.

Altitude

Pyrethrum grows best at high altitudes 1980 m above sea level and above. However, there are varieties suitable for low- medium altitudes ranging 1760-1980 m. Best flowering is achieved at over 2130 m above sea level.

Fertilization

Accurate fertilizer application rates are dependent on soil analysis results. The soil pH will also guide on which amendment will improve pyrethrum nutrition. Pyrethrum is a heavy feeder of Phosphorus, Calcium and Magnesium. Farmers may use the following general recommendations: Broadcast 4000 kg/acre of well decomposed Farm Yard manure three months before planting. Apply 50 kg/acre of Triple superphosphate (T.S.P) fertilizers during planting (1 teaspoon full per hole). Do not top-dress with nitrogen fertilizer.

Soil requirements

It is advisable have your soil tested in a reputable soil fertility analysis laboratory before commencing pyrethrum growing. Soil type and drainage strongly influence its sites suitability for pyrethrum growing. Soils should be well drained with good texture and structure in order to enable proper water infiltration and to minimize soil erosion. Pyrethrum

Freshly harvested pyrethrum flowers

thrives in well-drained, loamy volcanic soils rich in phosphorous, calcium and magnesium with a pH of 5.0 - 5.6.

NOTE: All farmers intending to grow pyrethrum should first test their soil. This will determine the pH and fertility level of the soil which is the first step in planning a sound nutrient management program.

ISFM practice in pyrethrum growing in Kenya

Integrated Soil Fertility Management (ISFM) approach combines appropriate interventions on soil management that include use of compost / farm yard manure, use of adequate amounts of mineral fertilizer, use of certified seed and applying good agronomic practice in pyrethrum production. ISFM therefore aims to optimize agronomic use efficiency of the applied nutrients for improved crop productivity.

Mulching

Mulching is the practice of covering the soil/ground with natural materials such as maize stover, wheat straw, legume biomass, and dead leaves to make more favourable conditions for plant growth. Mulching facilitates retention of soil moisture and helps in control of temperature fluctuations, improves physical, chemical and biological properties of soil, as it adds nutrients to the soil and ultimately

Mulching of Pyrethrum crop

enhances the growth and yield of crops. It minimizes weed problems and nutrient loss. It also improves soil structure directly by preventing raindrop impact and indirectly by promoting biological activity. Mulching also helps in soil organic matter build-up and provide nutrition for soil microbes for higher decomposition.

Soil and water conservation

Pyrethrum grows best in high altitude areas that also experience high annual rainfall amounts, hence more prone to surface soil erosion and nutrient loss through leaching. Developing soil and water conservation infrastructure would mitigate the potential soil, water and nutrient losses. Suitable soil and water conservation structures include bench terraces, raised beds and drip irrigation.

1. **Raised beds**

Raised beds are used in low midlands with heavy clay soils to reduce the chances of waterlogging. Pyrethrum cannot tolerate water logging. Thus the beds are usually 20 cm high and 30 cm wide.

Raised Beds in a Pyrethrum Farm

2. **Bench terracing**

Bench terraces are used in sloping lands with greater than 30% slope gradient and recommended for humid zones with moderate to steep slopes. Bench terraces consist of a series of beds which are more or less level running across a slope at vertical intervals, supported by steep banks or risers (walls or bunds).

Bench terraces in Pyrethrum

3. **Drip irrigation**

Drip irrigation is preferred for use in pyrethrum nurseries. It allows the optimal usage of the limited water resource by dripping water slowly into the crop roots at low pressure through drippers. Drip system saves water by minimizing evaporation losses and delivering water at the root zone where it is required.

Drip irrigation in Pyrethrum nursery

4. **Intercropping**

Intercropping is a common practice among small holder pyrethrum farmers due to small land sizes and high demand for food crops. Common practice involves pyrethrum-kale, pyrethrum-maize and pyrethrum-beans intercrops.

Pyrethrum-Kale intercrops

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