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INTEGRATED WEED MANAGEMENT IN TEA

(This Advisory Circular replaces Circular No. W1, Serial No. 12/71, issued in July 1971 on Weed Control in Mature Tea)

1. Introduction

Weeds, when present in tea lands, could interfere with the growth of tea by competing with light, nutrients and water and thus leading to lowered productivity levels. A dense weed cover could also interfere with routine field practices such as fertilizer application, pruning, forking etc., and, in addition, could also serve as alternate hosts for some tea pests and disease organisms.

Various practices are adopted for weed management in tea and these include manual, chemical, cultural, ecological and biological methods. Preventive measures are also seen to assume great importance as their adoption could lead to a reduction in the cost of weeding. Integrated Weed Management, which refers to a combination of some or all the above methods, in a rotational manner throughout the year, utilizes the available know-how on weeds and their management to achieve cost-effective and eco-friendly weed control (Fig.1).

2. Reason for a Build-up of Weeds

The abundant occurrence of weeds in tea fields could be attributed to factors such as poor bush stand resulting in extensive areas of exposed soil, high rainfall, delayed weed control rounds and surrounding neglected areas serving as weed seed-banks. The introduction of weed seeds and vegetative parts with applied compost and mulch, and resorting continuously to a single method of weed control are other attributes that have contributed towards a build-up of weeds in tea fields. A general understanding of the possible causes for weed build-up is important for the tea grower to select and integrate one or more of the more appropriate weed management methods.

3. Choice of Weed Management Methods

The decision making process utilized to arrive at the particular weed management technique that is to be adopted should be based on the cost factor, its impact on soil and environment and the possible risk of build-up of resistance in weeds to the herbicide used. The Climate and weather patterns of a given area should also be taken into consideration while formulating a suitable weed management programme.

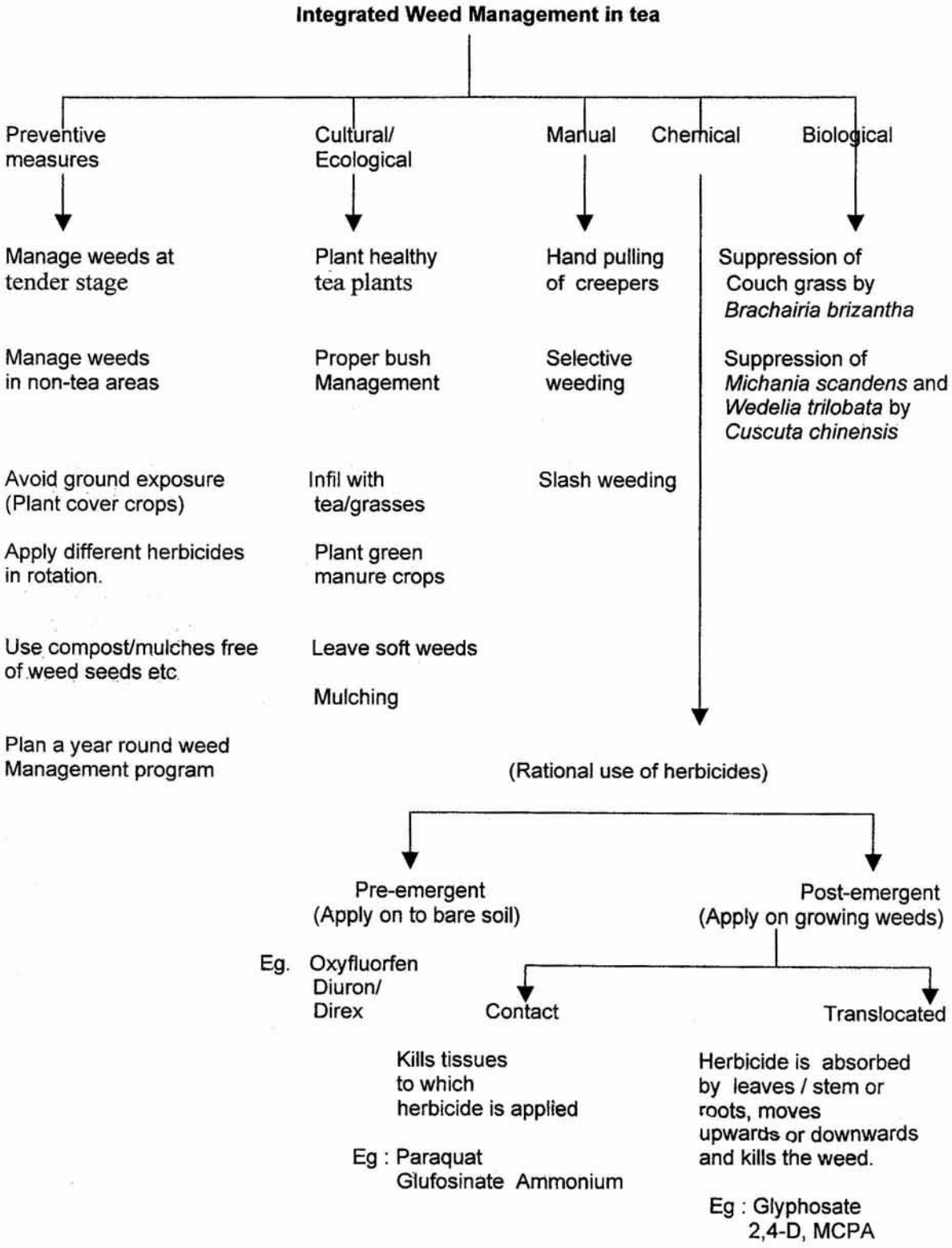

Fig.1. Components of Integrated Weed Management (IWM)

4. Methods of Weed Control

4.1. Preventive Measures

The objective of adopting preventive measures is to minimize weed seed build-up in the soil which would in turn assist in lowering the cost of management of the present and future weed population in tea fields. The appropriate preventive measures that could be adopted are as follows:

- Undertake weeding before the weeds reach a height of 10 – 15 cm, so that they may be removed before reaching the stage of flowering. This would necessitate undertaking weeding at approximately 8-10 week intervals.

- Keeping boundaries of tea fields, roadsides, ravines and other areas adjacent to tea fields free of weeds to prevent the continuous dispersal of weed seeds into tea fields. Any over-grown weeds in such areas should be kept slashed to prevent seeding or, in the alternative, using a suitable herbicide for keeping them under check.

- Planting cover crops in all exposed areas and utilizing uncultivated areas for thatch banks, or forestry, to suppress indiscriminate weed growth.

- Planning a year-round weed management programme so that all areas are given timely attention.

- Avoiding the use of a single herbicide or one method of weed control for long periods, since such a practice could lead to a weed shift where some weeds could dominate through development of resistance to the herbicide.

- Using compost and mulching materials in a more rational way, by taking due care that they do not bring into the tea fields weed seeds and other vegetative parts capable of regeneration.

4.2. Manual Weed Control

Manual weeding could either be undertaken by exclusively "hand-pulling" weeds or by "slash weeding", as described below:

Hand pulling is the removal of weeds totally by hand. Although a costly operation, it is a safer method than chemical weeding. However, the use of implements such as weed scrapers ("Sorandi") and mammoty for scraping the soil is strongly discouraged. (The use of "sorandi" was banned in 1951, by Soil Conservation Act No: 25 as it caused severe soil erosion in steep lands).

Clean weeding either by hand, or by using the scraper, should be strongly discouraged. Selective weeding should be advocated, where shallow rooted soft weeds are retained to serve as a live ground cover.

Digging the soil to remove tuberous or rhizomatous weeds is not advocated as such a practice could aggravate weed infestation arising through regrowth of fragmented underground plant parts that are capable of regeneration. Where rhizomatous weeds are present, chemical control measures should be undertaken.

Weeds that are resistant to herbicides should be hand pulled, along with other free-growing weeds.

All creepers such as *Mikania scandans* (Lokapalu), *Ipomoea augustifolia* (Heen madu wel), *Ipomoea learii* (Morning glory), *Anredera cordifolia* (Passali kodi), *Puraria phaseoloides etc.* which grow over the tea bush should be removed manually.

Slash weeding is the removal of weeds by cutting them at the base with a hoe, knife or mechanical weeder. Woody and deep-rooted perennial weeds, that resist removal by hand or herbicide, should be slashed. However, it should be noted that recovery is faster with this method of control.

All the weeds that are removed from a tea field should be piled up in a suitable place within the tea block. It is necessary to mix up the heap once in a while, to check and remove re-growing tuberous or rhizomatous weeds. Weeds should be used for composting only after picking out the yams, bulbils and other vegetative parts capable of regeneration, and destroying them.

4.3. Cultural and Ecological Methods of Control

The objective of adopting cultural and ecological techniques is to enable the quick establishment of proper ground cover so as to suppress the growth of weeds. This could be achieved by the adoption of the following practices.

- Use of suitable mulching materials such as Mana (*Cymbopogon confertiflorus*) or Guatemala grass (*Tripsicum laxum*), if available, to cover the inter-row spaces soon after planting tea. Loppings of shade trees, green manure crops, refuse tea, coir dust etc. could also be used for effective mulching.

- Adoption of all possible measures to encourage the early development of frames in the tea bush. This could be achieved by the use of healthy and well spreading nursery plants in new clearings, adoption of good agricultural practices, ensuring implementation of timely bringing-into-bearing operations and encouraging the natural spread of peripheral branches of the bush.

- Infilling all vacant patches in tea fields with quick growing, early spreading clones that would attain a quick ground cover and thereby shade out the weeds. In old tea fields where the vacancies are not expected to be infilled in near future, a suitable grass such as Mana, Guatemala or Vetiver grass (*Vetiveria zizaniodes*) may be planted in the vacant patches.

- Planting of green manure crops, such as *Crotolaria juncea*, wild sun flower (*Tithonia diversifolia*) or *Flemingia congesta* in vacant patches in tea fields is also useful. Cover crops such as *Arachis pintoii* or *Desmodium ovelifolium* could also be planted.

- Encouraging the free growth of soft weeds such as *Centella asiatica* (Gotukola), *Drymaria cordata* (Kadalai kodi), *Desmodium trifolium* (Heen undupiyaliya), *Euphobia* spp. (Heendada keeriya), *Oxalis* or other soft weed species found in low grown tea such as *Stemodia verticillata*, *Mollugo pentaphylla etc* may also be useful.

4.4. Chemical Weed Control

Chemical weed control is the most convenient and effective method among the various weed management techniques available. Unlike manual weeding with the use of implements, chemical weed control minimizes soil erosion and largely eliminates the loss of plant nutrients, which are carried away in the weeds removed from the field. However, precautionary measures should be adopted in the use of herbicides to avoid possible hazards to the crop, humans and the environment. (*See Advisory Circular No. WM3 on "Safe and Effective Use of Herbicides"*).

For the effective use of herbicides ensure that they are applied when the weeds are in an active stage of growth, when leaves are yet tender, which would be when they are 8 – 10 cm in height Pre-emergent herbicides (e.g. Oxyfluorfen) however, could be applied to the bare soil prior to thatching. Do not apply any other herbicide in young new clearings or during the first 6 months after pruning in mature fields.

When using any herbicide, follow the recommendations given by the TRI as well as the instructions supplied by the manufacturer and ensure that the appropriate dosage and dilution are used

Dependence on a single herbicide is strongly discouraged. Also, the number of herbicide applications per year should be minimized by adopting other weed management methods on a rotational basis.

Be on the watch out for weeds species that are not adequately controlled by the herbicide/s used. Such herbicide-resistant weeds necessitate manual removal to prevent their build up.

Avoid any herbicidal spray drifting on to the maintenance foliage of tea, as this would result in defoliation and long-term harm to the crop. Prevent spray drift to the tea by using a spray guard (*See Advisory Circular No. WM3 on "Safe and Effective Use of Herbicides"*).