

Integrated Weed Management in Tea Lands; Alternatives for Glyphosate

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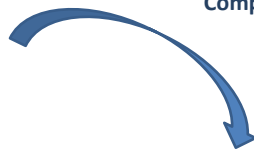
TYPES OF WEEDS – Introduction

Three Types Weeds

- Soft herbs

- General Weeds
- Problem Weeds

Compete with crop



Light
Water
Nutrients



SOFT HERBS



Heen Undupiyaliya,
(Desmodium triflorum)



Kukul Pala (*Drymaria cordata*)



Maha Undupiyaliya
(Desmodium heterophyllum)



Gotukola (*Centella asiatica*)



General Weeds



Kalanduru
(Cyperus rotundus)



Thandam pillu
(Crassocephalum crepidioides)



Kalukanberia
(Solanum nigrum)



Alawangupillu
(Erigeron sumatrensis)



General Weeds



Lime Weed
Polygonum
nepalense



Wal kolondu
Artemisia vulgaris



Gandapana
Lantana camara



Morning Glory
Ipomoea learii

Problem weeds



Girapala (Commelina)



Gatakola (Hedyotis)



Couch (Panicum repense)



Wal Nivithi
(Anredera cordifolia)



Foxtail Grasses
(Pennisetum polystachion)



Guniea grass
(Panicum maximum)

Beneficial effects of weeds

- Act as a vegetative cover
- Increase soil fertility
- Use as pastures and fodders
- Use as medicinal plants
- Use for consumption
- Host for beneficial insects
- Could be used as pesticides
- Involve in 'N' fixation (Leguminaceae spp)
- VAM Association

Cultural practices

Cultural practices	Direct & Indirect benefits
In-filling of vacancies	Increase yield Reduce erosion & heavy weed infestation
Thatching or mulching, cover crops	Reduces surface runoff Increases the rate of infiltration Prevent soil erosion
Mana planting in vacant patches	Retaining soil moisture during dry periods Provide nutrients Reduces weed growth
Shade management	Addition of organic matter & nutrients Less soil erosion Build up of soil organic matter
Burying of pruning	Increased water holding capacity Maintain favorable micro climate

Methods of Weed Management (Integrated Weed Management)

Manual - Hand pulling and slashing

Preventive measures- *To Minimize accumulation of weed seeds or propagules*

- *Undertake weeding before flowering*
- *Weed free roadsides, boundaries, ravines*
- *Plant cover crops in open areas/lands*
- *Avoid use of single herbicides*
- *Avoid dissemination of weed seeds through composting and mulching*

Integrated weed management contd...

Biological Methods

*Use Brachiaria brizantha to suppress couch grass
It can be practiced in open areas of tea lands*

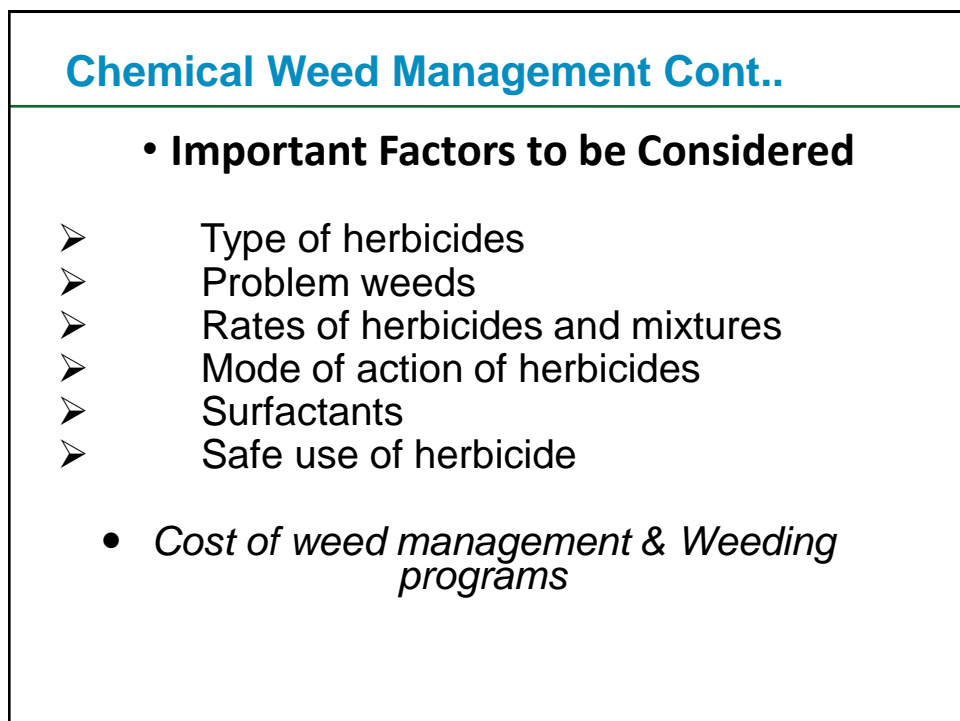
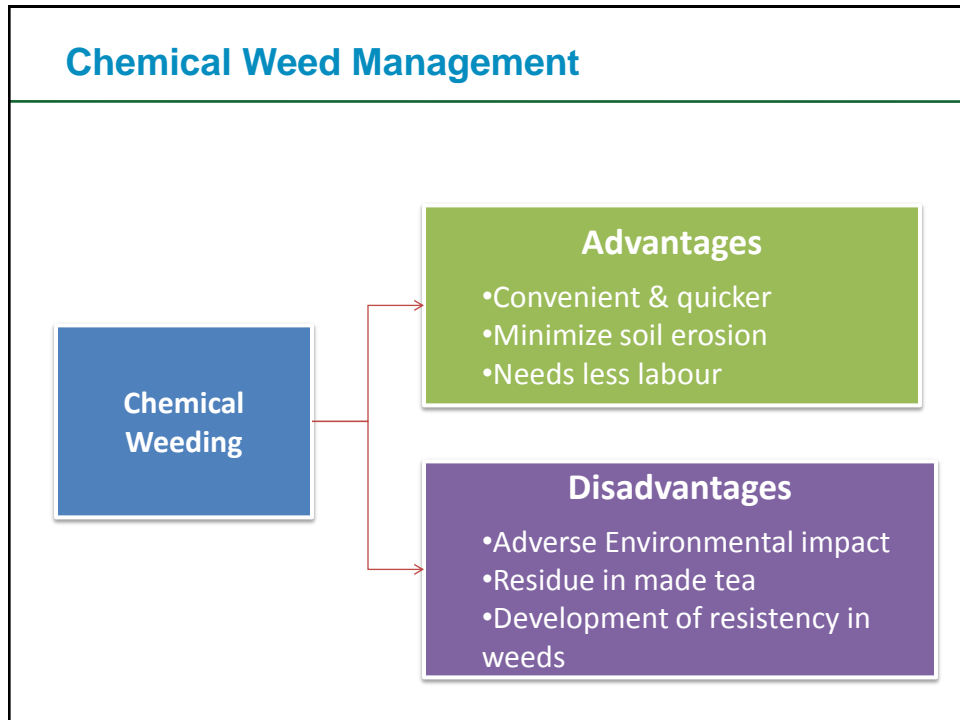
Cultural / Ecological Methods - (GAPs)

- Maintaining proper bush management
- Infilling vacant patches with grasses
- Mulching - lopping of shade trees, green manure, refuse tea
- Planting of green manure crops
- Encouraging growth of soft herbs
- Burying of prunings & weeds
- Avoiding use of single herbicide

Chemical Method **(Pre and Post emergent)**

Cir.WM1





Recommended Herbicides for Tea

Herbicide (a.i.)	Mode of action	Susceptible weeds
Diuron (80%)	Pre emergent	Broad leaf/grasses/ sedges
Oxyfluorfen (24%)	Pre Emergent	Broad leaf/grass/sedges
2,4-D (55/72%)	Systemic/Post Emergent	Broad leaf (Ipomea , <i>Borreria spp</i> , <i>Polygonum species</i> , <i>Commelina spp.</i>), <i>Hedyotis species</i> <i>Artemisia vulgaris</i> , <i>Eupatorium spp</i> , <i>Mikania</i> , <i>Sida spp.</i>)
MCPA (40/60%)		
Glufosinate Ammonium(15%)	Systemic & Contact/Post Emergent	Broad leaf/grasses/sedges

Alternatives for Glyphosate

Type of weeds	Chemicals in 550 L water/ha
Problem weeds; <i>Panicum spp</i> , Foxtail grass, Illuk , Getakola	Glu. Ammonium 1.5 -2l Or Glu.Ammonium 1.3 l+ Diuron 1.2kg
General weeds	Glu.Ammonium 1.3 l
<i>Commelina diffusa</i>	MCPA 1.75-3 l
Creepers	MCPA 1.75 l + Diuron 1.2 kg
<i>Cyperaceae spp</i>	Glu.Ammonium 1.3 l+ Diuron 1.2kg

Effective Weed Management Program

Depends on the bush cover

Rainfall pattern

Growth stage of tea

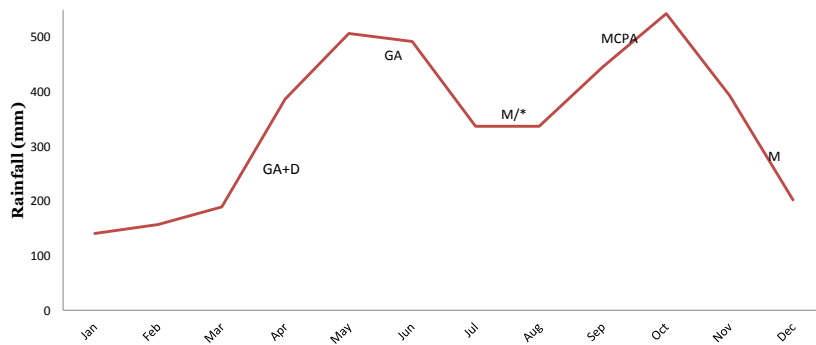
Young tea

Immature tea

After pruning

Mature tea (60% bush cover and poor bush standard)

Weather Pattern in Low Country



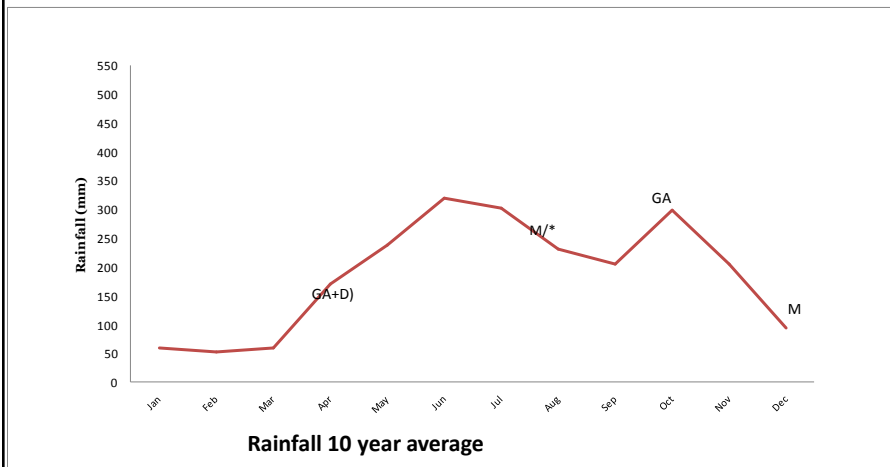
Rainfall 10 year average

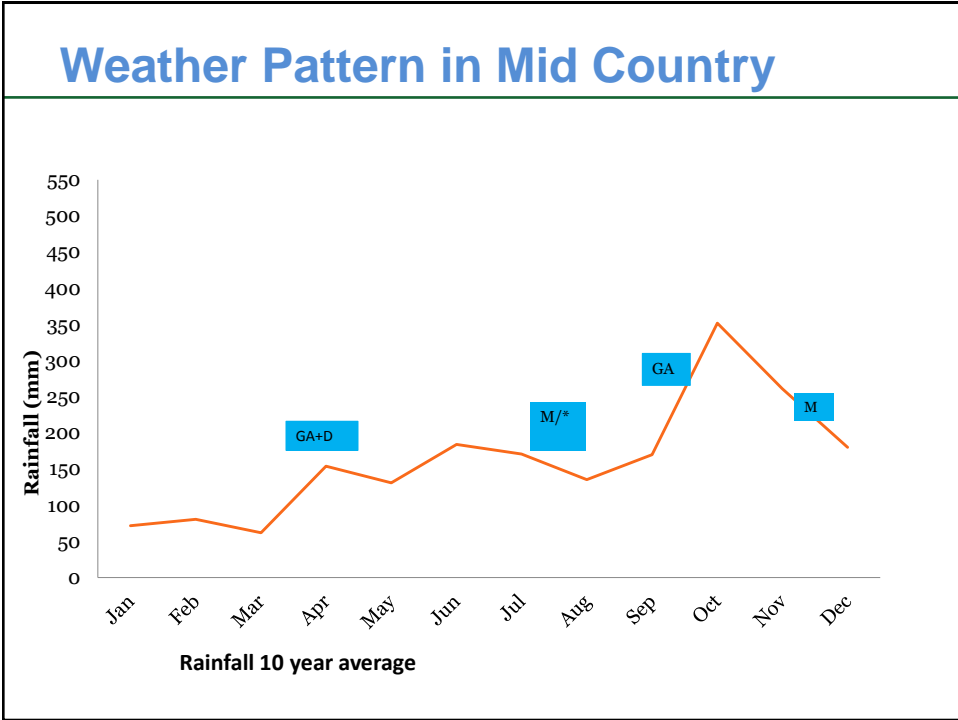
Weeding Calendar with Alternatives: Low Country

Tea Bush Cover	Jan/Feb	Mar/April	May/June	July/Aug	Sep/Oct	Nov/Dec
VP/Seedling with 60% stand		GA+D	MCPA	M/*	GA	M
Poor VP/Seedling		GA +D	MCPA	M/*	GA	M
		Late March after rain started	Late May/early June		Mid Sept. after rain started	Mid Dec.

D - Diuron M-Manual *-Oxyfluorfen GA- Glufosinate Ammonium

Weather Pattern in Up Country

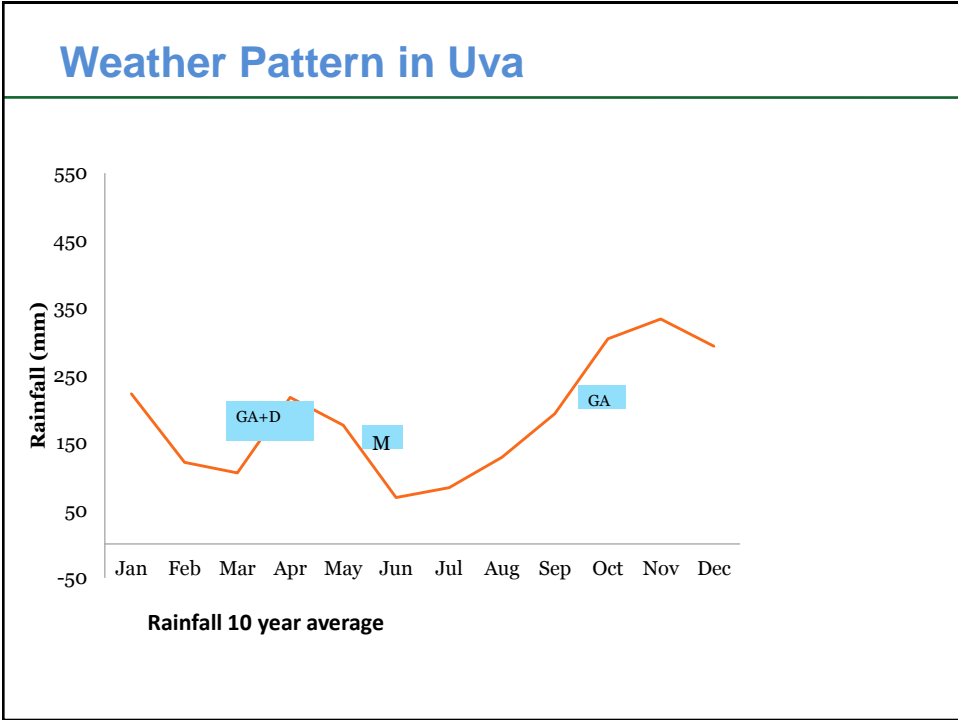




Weeding Calendar with Alternatives: Up /Mid Country

Tea Bush Cover	Jan/Feb	Mar/April	May/June	July/Aug	Sep/Oct	Nov/Dec
VP/Seedling with 60% stand		GA+D		M /*	GA	M
Poor VP/Seedling		GA +D	MCPA	M / *	GA	M
		After rain started	Late May/early June		Mid Sept. after rain started	Mid Dec.

M – Manual *- Oxyfluorfen D - Diuron , M-Manual GA- Glufosinate Ammonium



Weeding Calendar with Alternatives: Uva

Tea Bush Cover	Jan/Feb	Mar/April	May/June	July/Aug	Sep/Oct	Nov/Dec
VP/Seedling with 60% stand		GA+D	M		GA	
Poor VP/Seedling		GA +D	MCPA / M		GA	M
		Late March after rain started	Late May/early June		Mid Sept. after rain started	Mid Dec.

M-Manual *- Oxyfluorfen D - Diuron GA- Glufosinate Ammonium

Conclusions

- ❖ Considering adverse impacts (mainly crop loss) of weed growth, chemical weed control should be adopted as integrated manner.
- ❖ Manual weeding alone is not practicable due to labour scarcity in tea sector.
- ❖ Adhere to weeding calendars in respective regions depending on RF & type of weeds.
- ❖ Glyphosate Ammonium can be used as an alternative herbicides other than recommended herbicides.
- ❖ Adhere to all measures on safe & rational use of herbicide
- ❖ Attention to be made for environmental impact when use of herbicides



Thank you