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

Light
Water
Nutrients

Compete with crop
**SOFT HERBS**

- **Heen Undupiyaliya, (Desmodium triflorum)**
- **Kukul Pala (Drymaria cordata)**
- **Maha Undupiyaliya (Desmodium heterophyllum)**
- **Gotukola (Centella asiatica)**

**General Weeds**

- **Kalanduru (Cyperus rotandus)**
- **Thandam pillu (Crascocephalum crepidioides)**
- **Kalukanberia (Solanum nigrum)**
- **Alawangupillu (Erigeron sumatrensis)**
General Weeds

- Lime Weed
  *Poligonum nepalense*
- Wal kolondu
  *Artimesia 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

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

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**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)
Chemical Weed Management

Chemical Weeding

Advantages
• Convenient & quicker
• Minimize soil erosion
• Needs less labour

Disadvantages
• Adverse Environmental impact
• Residue in made tea
• Development of resistency in weeds

Chemical Weed Management Cont..

• Important Factors to be Considered
  ➤ Type of herbicides
  ➤ Problem weeds
  ➤ Rates of herbicides and mixtures
  ➤ Mode of action of herbicides
  ➤ Surfactants
  ➤ Safe use of herbicide

• Cost of weed management & Weeding programs
### Recommended Herbicides for Tea

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

### Alternatives for Glyphosate

<table>
<thead>
<tr>
<th>Type of weeds</th>
<th>Chemicals in 550 L water/ha</th>
</tr>
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</table>
| **Problem weeds:** Panicum spp, 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 |
| Commelina diffusa | MCPA 1.75-3 l |
| Creepers | MCPA 1.75 l + Diuron 1.2 kg |
| Cyperaceae spp | 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

![Weather Pattern Graph]

Rainfall 10 year average
Weeding Calendar with Alternatives: Low Country

<table>
<thead>
<tr>
<th>Tea Bush Cover</th>
<th>Jan/Feb</th>
<th>Mar/April</th>
<th>May/June</th>
<th>July/Aug</th>
<th>Sep/Oct</th>
<th>Nov/Dec</th>
</tr>
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<tbody>
<tr>
<td>VP/Seedling with 60% stand</td>
<td>GA+D</td>
<td>MCPA</td>
<td>M/*</td>
<td>GA</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Poor VP/Seedling</td>
<td>GA +D</td>
<td>MCPA</td>
<td>M/*</td>
<td>GA</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Late March after rain started</td>
<td>Late May/early June</td>
<td></td>
<td>Mid Sept. after rain started</td>
<td>Mid Dec.</td>
<td></td>
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D - Diuron    M-Manual    *-Oxyfluorfen    GA- Glufosinate Ammonium

Weather Pattern in Up Country
Weeding Calendar with Alternatives: Up / Mid Country

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<tr>
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<td>GA</td>
<td>M</td>
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<td>After rain started</td>
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Weather Pattern in Uva

![Graph showing rainfall pattern in Uva with months and rainfall levels.]

Weeding Calendar with Alternatives: Uva

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<tr>
<td>M-Manual</td>
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* 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.
- Glyfosinate 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