TEA RESEARCH ASSOCIATION
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QUARTERLY ADVISORY BULLETIN

Number 3 **July-September, 2016**

The Arunachal Advisory Centre, Tea Research Association, Itanagar (AP) with grand support of the Department of Trade & Commerce, Govt. of Arunachal Pradesh is issuing the 3rd edition of the "Quarterly Advisory Bulletin,2016" for the benefit of the tea growers of the state. This edition of the bulletin is compiled on the basis of necessary scientific approaches on field practices in tea cultivation to be adopted within this quarter of the year to maximize the production of quality green leaves. We expect the growers shall go through this bulletin and implement the advices in their tea fields to achieve desired crop in this season. We look forward for your valuable feedback to work together for the betterment of the upcoming tea industry of the state. Our official address is "Arunachal Advisory Centre, Tea Research Association, C/o Dept. of Trade & Commerce, APIDFC Building Ltd, C-sector, Itanagar-791111", e-mail ID- b.bordoloi@tocklai.net, Mobile no- 08471948330.

A. Management of Unprune Tea

- Continue to pluck close to janam in 7 days interval maintaining a flat and even plucking surface. Remove all the banjhi shoots at softer stage from the plucking surface along with ready two and a bud. Retain small growing shoots on the table to stimulate new growth.
- If there is any weak patches still exists with exposed stubs in unprune sections, adopt liberal plucking for 2-3 rounds to cover up the exposed stubs. Allow the pockets to fill up naturally to merge with the flat plucking surface without dipping hand in the pockets during plucking.

B. Management of LP, DS and MS Tea:

- Maintain 7 days round and pluck close to janam without retaining the fish leaf on the table to limit the chance of building up undue creep and encourage subsequent growth.
- If table is undulating due to longer round of plucking, go for a round of breaking break of exposed stubs for leveling the table. Shoots, below the table level should not be plucked.
- Pluck the peripheral branches of the light pruned and deep skiffed bushes at least 1 cm above the general height to encourage spreading of the plucking table and good ground coverage in quick time.
- If the light pruned and deep skiffed teas had suffered in long dry spell at the beginning of the season should continue to tip at the predetermined height removing only fully open two leaves and a bud in seven days interval to stimulate the formation of the plucking table.

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C. Management of Young tea:

- De-budding should be continued on the teas planted in March-April,2016 above 20 cm from the ground to encourage the lateral growth below that height by removing the swell up auxiliary buds causing no damage to the main stem and mother leaf.
- De-centered the teas planted in March-April,2016 within the month of August in inter flush dormancy period at the height of 20cm from the ground where 2-3 laterals have emerged below that height. Ensure good numbers of healthy foliage on the left over laterals below the cut mark prior to initiate the operation.
- Thumb pruned the single steamer plants at 20cm from the ground retaining good numbers of foliage above the break point.
- Already de-centered/head backed teas should be tipped at 65cm from the ground (60 cm in hilly areas of high altitude) to form the plucking table.

D. Management of Pest & Disease:

Important guidelines on PPC:

- Procure only TRA/CIB/PPC approved chemicals and apply in recommended dilution adopting appropriate spraying technique. Always maintain minimum interval of 7 days between spraying and plucking to achieve the endorsed maximum residue limit (MRL) of the applied chemical in made tea.
- Maintain adequate pressure (40 psi for pesticide sprayer and 10-12 psi for weedicide sprayer) in conventional spraying machine. Use proper nozzle for spraying.
- As much as possible avoid blanket application of pesticide, confine on spot treatment. Keep strict vigil on plantation for early detection of pest/disease occurrence.
- Put maximum thrust on appropriate cultural practices to reduce the attack of pest & disease.
- Always use protective gear at the time of pesticide application. Store the pesticide in safe ventilated places away from child, livestock, fire, water resources etc.
- Do not use the empty container of pesticide for household purpose. Dispose the empty container by burying at least 50cm depth in barren soil which is no use for cultivation purpose. Keep that area well fenced as a protective measure.
- Keep the tea plantation healthy and maintain bush hygiene throughout the year to minimize the chance of pest/disease attack. Keep the surrounding environment of the planting area neat and clean without disturbing the natural flora & fauna to keep the activities of predators and parasitoids alive for natural control of pest/disease.
- Use naturally available and TRA approved effective crude water extract of native plants as alternate of chemical pesticides for controlling pest & disease.

Helopeltis

Helopeltis, one of the major sucking pests has got favorable environment for building up due to the long wet spell prevails in the previous quarter of the year. If infestation is noticed the following measures should be taken up to control this pest.

- Black pluck the infested shoots prior to initiate any chemical control measure. The ground and the surrounding areas should be kept weed free taking special removal measures of the secondary host plants.
- The hanging shade tree branches on the plucking table and the ‘matidals’ of the tea bushes should be trimmed.
- Maintain the drainage system fully functional to drain out the rain water in quick time.
- Application of insecticide should be taken up immediate after plucking either in early morning or late afternoon when the pest is active on the tea bushes. Adopt barrier spraying technique against Helopeltis.
- If the infestation is noticed in patches apply Thiamethoxam 25 WG @ 50gm in 200 lit of water or, Thiacloprid @ 200 ml in 200 lit of water or, Clothianidin @ 45 ml in 200 lit of

water in spot using conventional sprayer machine. If infestation is already spread out, a blanket round may be necessary at 15 days intervals using alternate insecticide.

- In rainy season a round of synthetic pyrethroids like Bifenthrin or Fenpropenthrin 125ml in 200 lit of water (HV) may be applied in short rain free period if pest is active.
- Bio-garden should apply neem formulation like Azadiractin 5% @ 135 ml in 200 l of water.
- Application of 10% water extract of common weeds like *Clerodendrum viscosum (Ass- Dhopattita), Polygonum hydropiper(Ass- Pothorua bihlongoni) , Xanthium strumarium (Ass- Agora), Vitex negundo, (Ass- Posotia) Cassia alata (Candle Tree) etc* are quite effective against this pest. 10kg of the fresh foliage with tender stem and flowers of the mentioned weeds should be crushed and soaked in adequate water for around 36 hours. The volume should be increased to 100litres for maintaining 10 % concentration of the original raw material in ultimate spray fluid.

Red spider:

Though the infestation of Red spider is not so prominent in rainy season however, resurgence of this pest is found in favorable weather condition in the tea areas with inadequate shade status. Special care should be taken to improve the shade status of such sections. The following chemical and non-chemical measures are found effective in controlling Red spider mite.

- If infestation is noticed in patches apply a round of Fenazaquin 10% EC @ 500 ml in 200 lit of water, Hexythiazox @ 80 ml in 200 lit water, Fenpyroximate 5EC @ 100 ml in 200 lit of water etc at 15 days interval if live population is noticed. Alternate acaricide should be used in each round.
- In organic tea plantations spray of Neem formulation like Azadiractin 5% @ 135 ml in 200 l of water.
- *The water extract of common weed composition mentioned above is quite effective in controlling this pest.*

Greenfly & Thrips:

- Black pluck the infested section prior to initiate any chemical control measure.
- Take the chemical measures as mentioned against Helopeltis.
- Crude water extract of common weeds mentioned above is also quite effective against these pests.
- Yellow sticky trap is a very effective tool in controlling these pests. Place the trap at plucking table level fixing on a bamboo post @ 8-10 traps per bigha of infested planting area.
- Yellow sticky trap could be prepared by smearing thin layer of Hot Melt Pressure Sensitive Adhesive (HMPSA) diluting with normal thinner @ 300ml HMPSA in 1000ml of thinner on either side of hard Yellow plastic sheet having the size about 45cm x 45cm. Ready to use such traps are also available in the market. Alternately said adhesive smeared bright yellow colored polythene sheet may be wrapped on the trunk of shade tree at the level of plucking table for trapping these pests.

Looper Caterpillar:

This is the most devastating Sewing pest which attacks the foliage of tea plants in mixed brood. In severe infestation it completely defoliates the bushes. If infestation is noticed during this quarter of the year takes the following measures.

- If infestation is noticed on tea bushes by small caterpillar (1st instar) insecticides like Quinalphos 25 EC @ 500ml in 200l of water should be applied targeting the site of attack.
- In case of mixed brood attack Emamectin benzoate @ 80g in 200lit or Flubendamide @ 40g in 200lit should be applied covering entire tea bush.
- During monsoon recommended synthetic pyrethroid can be used.
- After chemical treatment, survived big caterpillars should be collected by hands, if infestation is confined to limited tea areas.

Black rot

This fungal disease infects the mature leaves of the tea bushes. The infection of this disease usually occurs from the month of April and reaches the pick in this quarter of the season. The following measures should be taken up against this disease.

- Remove all the infected dried up leaves from the infected bush prior to take any chemical measure.
- Apply 1-2 rounds of Hexaconazole 5EC @ 200 ml in 200 lit of water in 15 days interval targeting the under surface of the infected leaves.
- In severely infected sections continue spraying thereafter in monthly intervals till the disease disappears.

E. Weed management:

- In pruned and deep skiffed tea field, where ground is yet to cover up and weed growth is heavy; apply a round of Glyphosate @1000 ml in 200 lit water on succulent weeds of 8-10 cm tall before onset of monsoon.
- During monsoon Paraquat 500g in 200 lit of water should be applied on need basis.
- If necessary, Gluphosinate Ammonium 1.5 lit in 200 lit against broad leaf weeds can be applied in unprune tea sections.
- Young tea areas under +2 years should be avoided from application of weedicide. Always adopt manual approach for weed control in such areas.
- **The young tea fields of above +2 years, a mixture of Glyphosate 625 ml and Oxyfluorfen 300 ml in 200 lit of water is quite effective.**
- Over grown weeds should be sickled first and herbicide should be applied on re-growth.
- Obnoxious weeds like Fern/*Polygonum* /*Mikania* etc. should be manually uprooted.
- Always maintain 7days interval between spraying of weedicide and plucking to avoid the chance of finding residue in made tea beyond MRL fixed by CIB for the approved weedicides to apply in tea field.

F. Fertilizer Management:

- The second split of the chemical fertilizer should be applied within the month of August at a rain free weather condition and on weed free ground to get maximum utilization of the fertilizers by the tea plants.
- In plain areas, fertilizers should be applied uniformly on the ground as broadcast. In hilly areas, fertilizers should be applied in a half circular band on the up slope keeping 15-20 cm distance from the collar.
- The following table should be considered for fertilizer application in mature tea sections.

For Plain Areas					
Production of Green leaf (kg/bigha)	**Requirement of Nitrogen (kg/bigha)**	**Requirement of Phosphate (kg/bigha)**	**Requirement of Potash (kg/bigha) (on the basis of soil test report)**		
			Low (< 60 ppm)	**Medium (60-100 ppm)**	**High (> 100 ppm)**
Up to 900	Urea 25 kg	RP 10 kg	MOP 20 kg	MOP 15 kg	MOP 10 kg
900 - 1200	Urea 25 to 30 kg	RP 10 to15 kg	MOP 20 to25 kg	MOP 15 to18 kg	MOP 10 to 15 kg
1200 - 1500	Urea 30 to 40 kg	RP 15 to 25 kg	MOP 25 to 30kg	MOP 18 to 25 kg	MOP 15 to 22 kg
1500 - 1800	Urea 40 to 45 kg	RP 25 kg	MOP 30 to35 kg	MOP 25 to 30 kg	MOP 22 to 25 kg
For Hilly Areas					
Up to 360	Urea 15 kg	RP 10 kg	MOP 14 kg	MOP 11 kg	MOP 8 kg
360 - 600	Urea 15 to 25 kg	RP 10 kg	MOP 12 to 20kg	MOP 11 to 15kg	MOP 8 to 11 kg
600- 850	Urea 25 to 35 kg	RP 10 kg	MOP 20 to 25kg	MOP 15 to 22kg	MOP 11 to 15 kg

* **1 Hectare = 7.5 Bigha = 2.47 Acre (Land area measurement)**

* **RP- Rock phosphate (24% phosphate),ppm- an unit of measurement**

- At formative stage of young tea, YTD mixture should be applied in four splits at two monthly intervals with Nitrogen, Phosphate & potash @ ratio 10:5:10 (Nitrogen 10kg, Phosphate 5kg and Potash 10kg in 100 kg YTD mixture) where soil available potash is above 100ppm. If potash level is below 100ppm then the ratio of Nitrogen, Phosphate & Potash should be 10:5:15. The table below indicates the requirement of Nitrogen, Phosphate & Potash to prepare YTD mixture @ 10:5:10 (urea as the source of Nitrogen, SSP as the source of phosphate and MOP as the source of potash), total quantity of YTD mixture per *bigha* per year and the application procedure of the fertilizer mixture.

Age of the tea	**Nitrogen (kg/bigha /yr)**	**Phosphate (kg/bigha /yr)**	**Potash (kg/bigha /yr)**	**Filler (kg/bigha /yr)**	**Total quantity of YTD mixture including filler(kg/bigha/yr)**	**Application method of YTD mixture**
0 year	Urea 6-12	SSP 8-17	MOP 4-9	8-16	26-54 (Depending upon the growth vigor of the tea plant)	Ring in 2-3 splits &15 cm apart from the collar region
+1 year	Urea 23-29	SSP 33-42	MOP 18-22	33-40	107-133 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits &15 cm apart from the collar region
+2 year	Urea 29-35	SSP 42-50	MOP 22-27	40-48	133-160 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits & 20 cm apart from the collar region
+3 year	Urea 35-40	SSP 50-58	MOP 27-31	48-56	160-185 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits & 20 cm apart from the collar region
+4 year	Urea 40-43	SSP 58-62	MOP 31-33	56-60	185-198 (Depending upon the growth vigor of the tea plant)	Strip in 2splits
+5 year	Urea 40-43	SSP 58-62	MOP 31-33	56-60	185-198 (Depending upon the growth vigor of the tea plant)	Strip in 2splits

- **1 Hectare = 7.5 Bigha = 2.47 Acre (Land area measurement)**

- Filler as mentioned in the table should be incorporated with the chemical fertilizer to make up the volume and to avoid any chance of fertilizer injury to the young tea plant. Dry cattle manure, dry soil, dry coarse sand etc. may be used as filler.
- In +4 & +5 year old plantations, the 2nd split of YTD mixture should be applied in late August.

G. Clonal Nursery Management:

- To raise VP nursery in autumn, filling up of sleeves with top soil having pH range 4.5-5.0 and percentage of organic carbon not more than 1%, should be completed within September.
- In spring raised sleeve nurseries 1st round of sorting should be completed within September to facilitate equal growing condition for young saplings.

- Application of YTD mixture should be started from the month of August @ 10:5:10 diluted to 1:9 part by adding dry soil in monthly interval on the saplings attained the height of 15 cm with 4-5 leaves.
- Precaution should be taken in timely adjustment of the over head shade to prevent drip damage of the sleeves.
- Hand weeding should be done time to time to avoid the dominance of weed growth on the sleeves. Mossy growth should be scraped out to provide better aeration to the root zone of the young saplings.
- Protect the saplings from pest/disease attack by adopting TRA approved pest/disease management practices. Keep the drains free flow to provide prompt drain out of rain water from nursery site.

H. Shade Nursery Management:

In hilly area of low altitude and in plain area, shade tree is an integral part of tea plantations. Adequate shade provides the condition of healthy growth of tea and thereby reduces the chance of pest infestation or, disease infection. Shade improves the micro-climate of the tea area and helps the tea plants to withstand in adverse climatic condition like drought, hail etc. Well drained high land having perennial water source nearby should be selected as site to raise the shade tree nursery.

- TRA approved permanent species of shade tree are:
  Anadenenthera perigrina, Albizzia sinensis, Albizzia odoratissima, Acacia lenticularis, etc.
  TRA approved temporary shade species are:
  Indigofera teysmanii, Leucaena leucocephala, Melia azadirach etc.
- Dolomite @ 500gm per cubic meter of soil and SSP @ 1000kg per cubic meter of soil should be incorporated for filling up sleeves for shade nursery.
- The seeds should be collected from disease and pest free mature trees. Collected seeds should be sown directly in sleeves sized 30 cm lay flat, 60 cm long and 300 gauge thickness within the month of April.
- After sowing seeds, light mulching should be done followed by regular watering to keep the soil moist. No overhead shade is necessary.

List of CIB/TRA/PPC approved Agro-chemicals for use in Tea as on 1st July, 2016

Name of Chemicals	Trade Name	Name of manufacturer	Dose		MRL (ppm)		
ACARICIDES			**HV**	**LV**	**India**	**EU**	**Japan**
Dicofol 18.5 EC	Colonel-S	Indofil Industries Ltd	1:400	1:200	5	20	3
Ethion 50 EC	-		1:400	1:200	5	3	0.3
Fenazaquin 10 EC	–		1:400	1:200	3	10	0.01
Fenpropathrin 30 EC	-		1:1600	1:800		2	25
Fenpyroximate 5 EC/SC	Mitigate	Isagro (Asia) Agrochemicals Pvt. Ltd	1:2000	1:1000	–	0.1	10
	Pyromite	Excel Cropcare Ltd					
Hexythiazox 5.45 EC	Endurer	Corrommondal International	1:2500	1:1250	-	4	-
Propergite 57 EC	Mastamite	Chemtura Chemicals India Pvt. Ltd	1:400	1:200	10	0.05	5
Sulphur 80 WG	–		1:200	1:100	–	–	–
WettableSulphur 40 WP	-		1:200	1:100	–	–	–
Spiromesifen 240 SC (22.9 w/v)	Oberon	Bayer Crop Science Ltd	1:1000	1:500	–	50	30
Etoxazole 10 SC	Etoxazole	Sumitomo Chemical India Pvt. Ltd	1:1600	1:800	–	–	–
INSECTICIDES							
Azadirachtin 5% EC	Ecotin	P.J. Margo	1:1500		–	0.01	–
Bifenthrin 8% SC	–		1:1600	1:800	–	5	25
Clothianidin 50 WDG	Dantotsu	Sumitomo Chemical India Ltd	1:4500	1: 2250	–	0.7	–
Deltamethrin 2.8 EC	Decis	Bayer Crop Science Ltd	1:2000	1:1000	–	5	10
Phosalone 35 EC	–		1:400	1:200	–	0.05	2
Quinalphos 25 EC	-		1:400	1:200	0.01	0.1	0.1
Quinalphos 20 AF	–		1:400	1:200	0.01	0.1	0.1
Thiacloprid 21.7% SC	Alanto	Bayer Crop Science Ltd	1:1000	1:500	–	10	30
Thiamethoxam 25 WG	Thiomex	Ankar Industries	1:4000	1:2000	–	20	20
Emamectin Benzoate 5% SG	Missile	Crystal Crop Science Ltd	1: 2500	-	-	0.02	-
Flubendiamide 20 WG	Takumi	Rallis India Ltd	1:5000	-	-	0.02	-
HERBICIDES							
Glyphosate 41% SL	Globus	NagarjunaAgri chem. Ltd	2-3 l/ha		1	2	1
	Round - Up	Monsanto India Ltd	Do		Do	Do	Do
	Glycel 41 %	Excel Crop Care Ltd	Do		Do	Do	Do
	Run out	G.S.P. Crop Science	Do		Do	Do	Do
Glyphosate (Ammonium salt) 71% SG	Excel Mera	Excel Crop Care	1.5 kg/ha for broad leaf –2.0 kg/ha for mixed population		1	2	1
GlufosinateAmonium 13.5 SL	Basta	Bayer Crop Science Ltd	1kg in 200 l water for broad leaf and 3kg in 200 l water for monocot		0.01	0.1	0.3
Oxyfluorfen 23.5 EC	Oxygold	Indofil Industries Ltd	0.25kg a.i./ha		-	0.05	0.01
Paraquat Dichloride 24% SL/WSC	Herbucsone	Ankar Industries Pvt. Ltd	500 ml – 1 l/ha in 200 lit of water		-	0.05	0.3
FUNGICIDES							
Copper Oxychloride 50 WP	–		1:400	1:200	150 as Cu	40	–
Carbendazim 12 % + Mancozeb 63% WP	–		1:400	1:200			
Hexaconazole 5 EC	–		1:1000	1:500	–	0.05	0.05
Propiconazole 25 EC	Tilt	Syngenta India Ltd	1:1000	1:500	–	0.1	0.1
Spray adjuvant (Sticker)							
Magic Shakti		Nivshakti Bioenergy Pvt Ltd	20 ml/200 l water for insecticide,acaricide and fungicide				
Nutrastick		Gassin Pierre Pvt. Ltd	20 ml for contact & 50 ml for systemic insecticide, 30 ml for fungicide and 50 ml for herbicide in 200 l water				
Tip Top		KrishiRasayan	100 ml in 200 l water for insecticide, acaricide and fungicide				