TEA RESEARCH ASSOCIATION
Arunachal Advisory Centre
Dist. Papum-pare, Itanagar-791111 website-www.tocklai.net, e-mail- b.bordoloi@tocklai.net

QUARTERLY ADVISORY BULLETIN

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The Arunachal Advisory Centre, Tea Research Association, Itanagar(AP) is issuing this 2nd edition of the "Quarterly Advisory Bulletin, 2015" with the support of the Department of Trade & Commerce, Govt. of Arunachal Pradesh for the benefit of the tea growers of the state of Arunachal Pradesh. The cultural practices to be executed by the tea growers during this quarter of the season is elaborated in this issue for the best management of the tea fields to produce high quality green leaves. We hope the growers shall go through this bulletin and implement the advices in their tea fields to achieve desired crop in this season. Tea growers may communicate us for clarification on any measures suggested in this bulletin and any other technical guidance on tea field management through the e-mail ID- b.bordoloi@tocklai.net. Our official address is "Arunachal Advisory Centre, Tea Research Association, C/o Dept. of Trade & Commerce, APIDFC Building Ltd, C-sector, Itanagar-791111, Contact no- 08471948330 (M)".

A. Management of Unprune Tea:

- Due to moisture stress banjhi shoots are predominant in unpruned teas at the beginning of the season. Pluck close to janam and pluck all the banjhi shoots from the plucking table along with the growing two and a bud to ensure productive phases of the tea bushes from the beginning of the season.
- The unprune sections of tea with thin & weak maintenance foliage status should be plucked liberally at initial 2-3 rounds to cover up the exposed stubs to prevent die back. As and when the fresh layer of leaves has been uniformly added up, adopt 7days round of janam plucking. Do not dip hand inside the existing pockets of the plucking table; allow the pockets to fill up naturally.
- As and when the moisture builds up in soil but not adequate to apply fertilizer, and weather is not too dry, spray 2-3 rounds of the following mixture of 4kg urea + 2 kg zinc sulfate + 200 l water targeting the under surface of top 10-15 cm foliage in 15 days interval after 2days of plucking to boost up shoot growth. Alternately a mixture of NPK @ 2 % at fortnightly intervals can also be applied. (100 kg NPK mixture contains Urea 32.8 kg, DAP 20.4 kg and MOP 46.8 kg)

B. Management of LP, DS and MS Tea:

- Tip the Light prune, deep skiffed and medium skiffed teas at the measures suggested below removing only fully open and mature two leaves and a bud in seven days interval.
- Pluck the peripheral primaries of light pruned and deep skiffed teas at least 1 cm above the general height to accelerate rapid ground coverage and spreading of the plucking table.
- Take the tipping measures of mature teas from the cut mark. Adopt the tipping height of different types of pruning and skiffed teas as given below:

Tipping measures for different types of pruning/skiffing

Sl. No	Type of prune/ Skiff	Recommended height of tipping	Average numbers foliage to be retained above he cut mark
1	Light prune	20-25 cm above the cut mark depending upon the growth vigor of the tea	5 full leaves
2	Deep skiff	8-10 cm above the cut mark	2 full leaves
3	Medium skiff	5 cm above the cut mark	1 full leaf

C. Management of Young tea:

- De-bud the teas planted in last autumn above 20 cm from the ground by removing the growing buds at leaf base and top of plants (above 45 cm from ground) to encourage the lateral growth below that height. Take adequate care during this operation to avoid any damage to the stem and the mother leaves.
- After de-budding, when 2-3 laterals are emerged on main stem within 20cm height from the ground the main stem should be cut at 20cm during April-May after few rainfalls. The single steamer plants should be thumb pruned by breaking the main stem half way at 20cm from the ground within this period.
- The tipping measures of the de-centered and frame formation pruned (FFP) teas should be followed as indicated below.

Sl. No	Type of operation	Recommended height of tipping
1	De-centering/ Thumb prune	Above 65 cm from the ground in low altitude and plain area. 60 cm from the ground in high altitude above 1200 m AMSL.
2	FFP-1 at 30-35 cm above ground	-do-
3	FFP-2 at 35-40 cm above ground	25 cm above pruning level

D. Management of Pest & Disease:

- **Always follow good agricultural practices (GAP) and maintain bush hygiene to reduce the incidence of pest and disease in the tea fields.**
- **Maintain recommended time gap of minimum 7days between spraying and plucking to avoid the chances of detecting residue of pesticides in finished product beyond MRL.**
- **Procure and use only TRA/CIB/PPC approved chemical pesticides (as per list attached) with recommended dilution. Always select the high MRL pesticides for use in tea.**
- **Adequate measures should be taken on cultural practices and mechanical control measures to reduce the chances of building up of pest population/ pathogen of disease in the tea fields and thereby reduce the load of chemical pesticides in your tea fields.**

Helopeltis

Helopeltis is a major sucking pest of tea. Infestation of this pest is normally noticed from the month of April. Appropriate control measures should be taken to control this sucking pest at the early stage of emergence.

- 10% Water extract of common weeds like *Clerodendron viscosum, Polygonum hydropiper, Vitex negundo, Cassia tora* etc can be applied. 10kg of fresh foliage with tender stem and flowers should be crushed and soaked in adequate water for around 36 hours. Then the mixture is to be strained through muslin cloth and volume should be increased to 100 l to get 10% concentration of the original raw material in ultimate spray fluid. Consult QAB, No-4, 2014 for photographs of these weeds for easy identification. You may also download the pictures from net by searching through *google* using the scientific name.
- In unprune tea, pluck the infested shoots before taking up any chemical control measure. Remove all the shoots leaving only unopened buds on the table (black plucking) during the period of Helopeltis infestation. In light pruned and deep skiffed bushes it should be done only after establishment of the plucking table.
- Keep the ground and the surrounding areas weed free. Take special removal measures of the secondary host plants. Avoid the chances of localized water-logging by keeping the ground even and flat.
- Trim the hanging shade tree branches and the 'matidals' of the tea bushes and keep the drainage system fully functional for quick discharge of rain water from the tea area.
- Application of insecticide should be taken up immediately after plucking. Adopt barrier spraying technique against Helopeltis. To get better result, spraying should be done in early morning or late afternoon when the pest is active on the tea bushes.
- If the infestation is noticed in patches apply Thiamethoxam 25 WG @ 50gm in 200 l of water or, Thiacloprid @ 200 ml in 200 l of water or, Clothianidin @ 45 ml in 200 l of water in spot. In case of spread out infestation, blanket round may be required at fortnightly intervals using alternate insecticide.
- Organic tea plantations should apply Neem formulation like Azadiractin 5% @ 135 ml in 200 l of water and the herbal extract mentioned above.

Red spider:

- Red spider mites are found active from the beginning of the season and build up rapidly from the residual population.
- Thinly shaded tea areas are more prone to spider mite. Take special care to improve the shade status in such sections.
- Establish hedges along the boundary with herbs having insecticidal property and not preferred by cattle like *Vitex negundo*.
- Apply the herbal extract as suggested under Helopeltis.
- Within the month of April under mild weather condition moderately infested sections should be treated with Sulfur 80WG @ 1 kg in 200 l of water.
- If infestation is in increasing trend, apply a round of Propergite 57EC @ 500 ml in 200 l of water in spots only. The follow up round should be applied with Fenpyroximate 5EC @ 100 ml in 200 l of water, Hexythiazox @ 80 ml in 200 l water, Fenazaquin 10% EC @ 500 ml in 200 l of water etc in 15 days interval if infestation persist. Alternate acaricide should be used in each round.
- In organic tea plantations can repeat Sulfur 80WG @ 1kg in 200 l of water and Neem formulation like Azadiractin 5% @ 135 ml in 200 l of water alternately at 8-10 days.

Thrips and Green fly

- Infestation of Thrips and Green fly is noticed in unprune sections at the beginning of the season. If infestation persists adopt black plucking to remove the entire shoot from the plucking table leaving only un-open buds on the table.
- Use light/fire trap against green fly. Use yellow color traps against green fly and thrips. These traps can be made in garden itself by using colored semi hard poly sheet smeared with sticky petroleum gel or used engine oil. For details of different kinds of traps please refer to the latest TRA special bulletin on traps.

- Apply a round of Thiomethoxam 25% WG @ 50 gm in 200 l of water in these sections with a follow up round with Thiacloprid 21.7% SC.

Blister Blight

In high elevation garden this fungal disease may occur during monsoon period from June – September, if weather is foggy with temperature around 20 ^{0}C. Yellowish white blister are formed due to fungal growth on the under surface of the tender leaves, if the weather remains cloudy and humid for a long period. The following measures should be taken during the period of infection.

- Adopt black plucking to remove all the infected shoots.
- The heavy shade should be thinned out for better light penetration in the section.
- Green crop in the young tea sections should be lopped during the period of blister blight infection.
- A round of Hexaconazole 5EC @ of 200ml in 200 l of water by using power sprayer for faster coverage. A follow up round should be sprayed in 7-15 days interval depending upon the level of infection.

Black rot

Black rot is a fungal disease which infects the mature leaves of the tea bushes resulting in decay/drying up and defoliation. The infection of this disease generally occurs from the month of April and reaches the pick in June-July. The following measures should be taken up against this disease.

- If section is over shaded, lop shade tree branches for aeration and adequate sunlight.
- Improve drainage, if waterlogging.
- Remove 'matidal' of tea bushes in case of dense section to improve aeration.
- Remove all the infected dried up leaves from the infected bush prior to take any chemical measure.
- Apply a round of Hexaconazole 5EC @ 200 ml in 200 l of water targeting the under surface of the infected leaves following up with 15 days interval.
- Continue spraying in 15 days interval with Hexaconazole 5EC in severely infected sections for initial 2-3 rounds and thereafter in monthly intervals in spot only till the disease disappear.

E. Weed management:

- In pruned and deep skiffed field, where ground is exposed and weed growth is heavy, Glyphosate 41%SL @ 1000 ml in 200 l water should be applied on succulent weeds of 8-10 cm tall covering around 60 % of the ground. It should be repeated after 3-4 weeks in spots.
- After the above rounds, if only broad leaf weeds are growing, apply a round of Gluphosinate ammonium13.5 SL @ 1.5 lit in 200 lit of water at tender stage.
- Both the above rounds should be completed before monsoon.
- During monsoon Paraquat 500g in 200 lit of water should be applied, if necessary.
- In unprune tea Paraquat for grass or Gluphosinate Ammonium for broad leaf can be applied on need basis.
- Over grown weeds should be sickled first and followed by herbicide application on re-growth.
- Obnoxious weeds like Fern/*Polygonum* /*Mikania* etc. should be manually uprooted.

F. Management of Hail Damage:

Hail damage is one of the major natural calamities faced by the tea bushes from March to May. The following measures should be taken up for quick recovery from the damage done by hail.

- Apply a round of recommended fungicide within 24 hours of occurring hail damage to prevent secondary infection. Treatment of hail damaged tea should be planned like Young tea – LP – DS - MS – UP.
- Allow the new growth to reach the predetermined tipping height and tip/re-tip them to form the plucking table.
- If the top layer of the foliage in unprune tea is severely damaged than add a fresh layer of foliage by plucking liberally. Allow the created pockets to fill up at the earliest.
- As and when the new growth emerged from the damaged bushes apply foliar nutrition as suggested above.
- Keep strict vigil on such sections to protect from any pest attack or, infection of disease.

G. Fertilizer Management:

- In adequately moist soil (up to the depth of 45cm) apply the first round of chemical fertilizer on mature tea sections within mid May. In unprune tea after 2-3 rounds of plucking and in LP/DS tea 2-3 new leaves should emerged from the primaries before applying fertilizer.
- First round fertilizer mixture should contain 60% of total Nitrogen (Urea) and Potash (MOP) and entire quantity of Phosphate (Rock Phosphate).
- The quantity of Nitrogen (Urea) should be fixed up on the basis of pruning cycle average green leaves production and depending upon the soil test report Potash (MOP) fertilizer should be calculated. The time gap between two LP operation is called pruning cycle.
- 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 a distance from the collar.
- The following table should be considered for fertilizer application in mature tea sections.

For Plain Areas					
Cycle average Green Leaf production (kg/ha)	Requirement of Urea in terms of Nitrogen (kg/ha)	Requirement of RP in terms of Phosphate (kg/ha)	Requirement of MOP in terms of Potash (kg/ha) (on the basis of soil test report)		
			Low (< 60 ppm)	Medium (60-100 ppm)	High (> 100 ppm)
Up to 6500	Urea-195	RP-83	MOP-150	MOP-117	MOP-83
6500-9000	Urea – 195-240	RP-83-125	MOP-150-183	MOP-117-133	MOP-83- 116
9000-11000	Urea-240-304	RP-125-208	MOP-183-233	MOP-133-200	MOP-116- 167
11000-13500	Urea-304-358	RP-208	MOP-233-275	MOP-200-233	MOP-167-200
For Hilly Areas					
Up to 2700	Urea – 130	RP-85	MOP – 100	MOP – 100	MOP-85
2700-4500	Urea – 130 – 195	RP – 85	MOP – 100 – 150	MOP – 100 – 150	MOP – 85 – 116
4500-6500	Urea – 195-260	RP- 85	MOP-150- 200	MOP – 150- 200	MOP – 116 – 166

*** ppm- an unit of measurement (one part in one million part)**

- At formative stage of young tea, YTD mixture should be applied 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, Single Super Phosphate as the source of phosphate and MOP as the source of potash), required total quantity of YTD mixture per hectare per year and the application procedure of the fertilizer mixture.

Age of the tea	Urea (kg/ha/yr)	Single Super Phosphate (kg/ha/yr)	MOP (kg/ha/yr)	Filler (kg/ha/yr))	Total quantity of YTD mixture including filler(kg/ha/yr)	Application method of YTD mixture
0 year	43-87	63-125	33-67)	61-121	200-400 (Depending upon the growth vigor of the tea plant)	Ring in 2-3 splits &15 cm apart from the collar region
+1 year	173-217	250-312	133-167	244-304	800-1000 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits &15 cm apart from the collar region
+2 year	217-260	312-375	167-200	304-365	1000-1200 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits & 20 cm apart from the collar region
+3 year	260-304	375-438	200-233	365-425	1200-1400 (Depending upon the growth vigor of the tea plant)	Ring in 4 splits & 20 cm apart from the collar region
+4 year	304-326	438-469	233-250	425-455	1400-1500 (Depending upon the growth vigor of the tea plant)	Strip in 2splits
+5 year	304-326	438-469	233-250	425-455	1400-1500 (Depending upon the growth vigor of the tea plant)	Strip in 2splits

- Filler like sand/soil/cattle manure/compost/vermin-compost etc 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.
- First split application of YTD mixture should be completed on moist weed free ground within April. A gap of 6-8 weeks should be maintained between two splits of application.
- In '0' year plant, if planting is done in March-April, 1st split application should be done as and when the saplings produce some new growth indicating their establishment.
- In +4 & +5 year old plantations, 1st split should be completed in April-May and the 2nd split should be applied in late August.

H. Clonal Nursery Management:

- To raise VP nursery in spring, filling up of sleeves with top soil having pH range 4.5-5.0 and organic carbon not more than 1%, should be completed within April.
- Only semi hard green cuttings with swollen auxiliary bud collected from healthy primaries should be planted within June to achieve better strike rate.
- Already selected mother bushes (protected from pest infestation and disease infection) should be treated with 2kg Zinc sulfate in 200 l water by means of foliar application for 2-3 rounds in 7days interval prior to take cuttings.
- Prepared cuttings should be dipped in 0.1% Zinc sulfate solution (10gm Zinc sulfate in 10 l water) for 5 minutes before planting in sleeves.
- Agro-shade nylon net having the capacity to resist 75% light should be used to erect the over head shade structure for VP nursery. The height at higher side of slope of the shade should be around 2.7 m cm from the sleeve top and the lower side should be 1.8cm to avoid drip and heat damage. In each slope, two beds of 120 cm width and with any convenient length should be covered. Sleeve beds should be separated by 30cm x 30cm drains to provide adequate passage to run off water.
- After planting of cuttings if the sleeve top is covered with moss, scrape out the mosses to provide aeration to the cuttings.

I. Shade Nursery Management:

In hilly area of low altitude (up to 3000 ft amsl) and also 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. The following measures should be taken to establish shade nursery.

- Shade nursery for both permanent and temporary species should be raised. Well drained high land having good water source nearby should be selected as site to raise the nursery of both permanent and temporary shade tree.
- TRA approved permanent species of shade tree are as given below:

Anadenenthera perigrina, Albizzia sinensis, Albizzia odoratissima, Acacia lenticularis, *Derris robusta* etc.

TRA approved temporary shade species are *Indigofera teysmanii, Leucaena leucocephala, Melia azadirach* etc.

- Dolomite @ 500gm per cubic meter of soil and SSP @ 1 kg per cubic meter of soil should be incorporated for filling up sleeves for shade nursery.
- If seeds are sown directly on beds apply SSP 125 g/sq. m of soil.
- The seeds should be collected from the selected 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 approved chemicals (as on April, 2015)

(Prepared in the line with the list of approved PPFs for Plant Protection Code (PPC): version 3.0 by Tea Board)

Name of Chemicals	Trade Name	Dose		MRL (ppm)		
ACARICIDES		**HV**	**LV**	**India**	**EU**	**Japan**
Bifenthrin 8 SC	–	1:1600	1:800	–	5	25
Dicofol 18.5 EC	Diumite	1:400	1:200	5	20	3
	Colonel-S	Do	Do			
Ethion 50 EC	Ethion	1:400	1:200	5	3	0.3
Fenazaquin 10 EC	–	1:400	1:200	3	10	0.01
Fenpropathrin 30 EC	Meothrin	1:1600	1:800		2	25
Fenpyroximate 5 EC/SC	Sedna		1:1000	–	0.1	10
	Pyromite					
	Mitigate					
Hexythiazox 5.45 EC	–	1:2500	1:1250	–	4	–
Propergite 57 EC	–	1:400	1:200	10	5	5
Sulphur 80 WG	–	1:200	1:100	–	–	–
WettableSulphur 40 WP	Share	1:200	1:100	–	–	–
Spiromesifen 240 SC (22.9 w/v)	Oberon	1:1000	1:500	–	50	30
Etoxazole 10 SC						
Flumite 20 SC						
Flufenzine 20 SC						
INSECTICIDES						
Azadirachtin 5% EC	–	1:1500		–	0.01	–
Bifenthrin 8% SC	–	1:1600	1:800	–	5	25
Clothianidin 50 WDG	Dantotsu 50 WDG	1:4500	1:2250	–	0.7	–
Deltamethrin 2.8 EC	Decis	1:2000	1:1000	–	5	10
Phosalone 35 EC	–	1:400	1:200	–	0.1	2
Quinalphos 25 EC	Flash	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	1:1000	1:500	–	10	30
Thiamethoxam 25 WG	Thiomex	1:4000	1:2000	–	20	20
HERBICIDES						
Glyphosate 41% SL	Globus	0.8kg a.i. /ha -1.2kg a.i. /ha		1	2	1
	Round – up					
Glyphosate 71% SG	–	1.5 kg/ha for broad leaf – 2.0 kg/ha for mixed population		–	2	1
GlufosinateAmonium 13.5 SL	–	1.5 kg/ha for broad leaf – 2.0 kg/ha for mixed population		0.01	0.1	0.3
Oxyfluorfen 23.5 EC	Oxygold	0.25kg a.i./ha			0.05	0.01
Paraquat Dichloride 24% SL/WSC	Herbucsone	1lit/ha in 200 lit of water		–	0.05	0.3
FUNGICIDES						
Hexaconazole 5 EC	–	1:1000	1:500	–	0.05	0.05
Propiconazole 25 EC	–	1:1000	1:500	-	0.1	0.1
****Carbendazim 12% + Mancozeb 63% WP**						

NB: 2, 4-D, Copper oxychloride, Copper hydroxide and Profenophos have been removed from the earlier list published as on 1st October, 2014 till further notification.

2, 4-D, Copper Oxychloride, Copper Hydroxide, Profenophos, Bitetranol have been removed from this list for the time till further notification following gazette notification of Ministry of Agriculture S.O. 2486 (E) dated 24th September, 2014. **** Yet to be uploaded in CIB website**