TEA RESEARCH ASSOCIATION

Arunachal Advisory Centre

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QUARTERLY ADVISORY BULLETIN

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The best cold weather management practices are comprised with management of un-prune and young tea, adoption of proper pruning policies for excellent crop distribution throughout the cropping season, integrated pest management packages and practices based on current plant protection code (PPC), adequate drainage development, conservation of soil moisture, ground cleaning, ground leveling without losing top soil etc. Plucking of the backend crop also should receive utmost care in this quarter of the year. Arunachal Advisory Centre, Tea Research Association, Itanagar (AP) is issuing this "Quarterly Advisory Bulletin" targeting to provide adequate technical guidance to the tea growers of the state of Arunachal Pradesh to manage their tea fields with best possible scientific ways and means. We hope the tea growers of the state shall go through this issue and shall be benefitted by implementing the advices in their tea fields.

A. Plucking & management of unprune tea:

- Pluck close to janam in 6-7days interval removing all the ready two and a bud and soft banjhi shoots maintaining the plucking table flat & even. Stimulate the new growth by retaining the small shoots on the table.
- Apply the formulation of Urea 4kg + Zinc sulfate 2kg + water 200 liters (High Volume) after 2days of plucking maintaining an interval of 15 days. Apply this formulation for 2-3 rounds targeting the under surface of top 10-15 cm foliage within the month of October-November for crop maximization.
- Pluck the proposed unprune sections with at most care to keep the table flat & even leaving no exposed stubs. If foliage status of these sections is weak or thin add a fresh layer of foliage within 3-4 rounds of plucking during the period of mid October to end November.
- Proposed unprune sections should be treated with the formulation MOP 4kg + Magnesium sulfate 2kg + water 200 liters (HV) in monthly intervals starting from mid October - February targeting the undersurface of the top foliage to withstand drought.
- Necessary steps should be taken to mulch the unprune sections with any green matter within November for better management of moisture stress in cold weather.

B. Pruning & Skiffing :

Pruning, the periodical cut back operation of mature tea bushes is necessary for active vegetative growth to maximize green leaf production. In tea plantation a definite pruning cycle like LP-UP-DS in young tea and LP-UP-DS-UP/MS in mature tea has to be adopted for excellent crop distribution throughout the cropping season. Adoption of appropriate pruning cycle keeping 25% LP, 25% DS, 10-15% MS and 35-40% unprune

teas in 4 year pruning cycle (LP-UP-DS-UP/MS) and in 3 year pruning cycle (LP-UP-DS) with 33%LP, 33%DS & 34%UP ensures not only steady production but also reduces the chances of pest/disease occurrence and ill effects of adverse climatic condition.

Light Prune (LP):

- Light pruning should be imparted 5cm (2") above the last light pruned (LP) mark by maintaining equal frame height. In hill slopes this operation should be done along the natural slope.
- Keeping a breather at the centre of the pruned bush helps in maintaining the water pull. The breather should be removed at the same height of the pruning level as and when new bud break emerges.
- Impart a round of knife cleaning operation to remove the unproductive branches and 1-2 central knots from the pruned bushes. Apply a round of Trichoderma suspension of 5% strength or, COC (1:400 HV) within 48 hours of pruning.
- Apply a round of lime wash (Quick lime 6kg + washing soda 12 kg + water 200 litres) on the frame using conventional sprayer. Clean the bushes after 3-4 days of applying lime wash with a hessian cloth.
- Protect the bushes from any sort of pest incidence.

Deep Skiff (DS):

- Complete this skiff operation within mid November – mid December at 15-17 cm above the last light pruned mark retaining the fork of at least 1.5 cm long formed at that level.
- Don't remove the left over foliage from the skiffed bush if there is no severe infestation of mite pest. Clean the bushes by hand to remove the unproductive twiggy branches.

Medium Skiff (MS):

- Medium skiff should be done within December by removing the current year's 'crow's feet' formed on the plucking table.
- No follow up cleaning operation is necessary after MS.

Level-off Skiff (LOS):

- Execute this skiff operation on proposed unprune teas if the plucking table is uneven and required to be made flat and even by knife to remove 50-60% plucking points of the current year.
- Time of this skiffing operation is early January, when the teas attain total dormancy and the soil has sufficient moisture to prevent dieback of left over plucking points.

C. <u>Management of Young tea:</u>

- The young tea of +2 years age should be mulched with any green matter within mid October-November to restrict loss of soil moisture maintaining a gap of 10-15 cm around the collar region.
- Application of MOP @ 2% 3-4 rounds in monthly interval starting from the month of November - February is quite effective to eliminate the ill effect of moisture stress.

- Keep strict vigil in young tea sections to eliminate the chance of building up any pest population in back end cropping season.
- Improve the foliage status of proposed unprune young tea sections by adopting liberal plucking in the month of November to fill up the existing pockets in the plucking table.
- Keep the ground flat and even and remove the collar depressions by a round of cheeling operation before building up moisture stress in soil. If necessary improve the drainage system within November-December.
- Allow building up of adequate starch in root zone of young teas by avoiding plucking from the month of November where to impart FFP-I or, FFP-II in January.
- If not done, prune the +2 / +3 years plants (FFP-I) at the height of 35-40 cm from ground level and +4/+5 years plants (FFP-II) at the height of 40-45 cm within January.

D. Integrated Pest Management (IPM) & Plant Protection Code(PPC):

Tea board of India introduces stringent regulation through Plant Protection Code (PPC) based on the approved chemicals of Central Insecticidal Board (CIB) to use in tea with the fixed maximum residue level (MRL) in made tea against each chemical. The tea growers should adopted the guide lines of TRA/CIB/PPC for pest management practices to thrive in the world consumer market of tea. Adoption of proper scientific cultural practices, early detection of pest/disease emergence, use of botanicals and other effective tools, in unavoidable situation application of chemical pesticides at right time in recommended dilution, adequate time gap between spraying of chemicals and harvesting are the components of integrated pest management (IPM) practices introduced by Tocklai Tea Research Institute, TRA.

Salient points on IPM & PPC:

- Follow Good Agricultural Practices (GAP) to maintain good health of your tea.
- Apply all possible and safer methods of pest management like cultural, mechanical, physical, botanicals, biological etc as recommended under IPM for each pest to minimize load on inorganic toxic pesticides.
- Confine with application of TRA/CIB/PPC approved pesticides in appropriate dilution and maintain adequate time gap between spraying and plucking. Use proper nozzle and maintain adequate pressure (40 psi for pesticide sprayer and 10-12 psi for weedicide sprayer) in conventional spraying machine.
- As much as possible avoid blanket application of pesticide. Keep strict vigil on plantation for early detection of pest/disease occurrence and apply pesticide in infested spot only.
- Always wear protective gear at the time of pesticide application. Store the pesticide in safe ventilated places away from child, livestock, fire, water resources etc.
- Dispose the empty container by burying at least 50cm depth in barren soil which is no use for cultivation purpose.
- Use naturally available and TRA approved effective crude water extract of native plants as alternate of chemical pesticides for controlling pest & disease.

Helopeltis management:

Helopeltis, one of the major sucking pests in tea cultivation could build up rapidly in this quarter. Keep strict vigil against this pest and if any infestation noticed take necessary measures as mentioned below.

- Pluck the infested shoots adopting black plucking before taking up chemical control measure.
- Keep the ground and the surrounding areas weed free taking special removal measures of the secondary host plants.
- Thin out the heavy shade and hanging shade tree branches on the plucking table. Remove the 'matidals' of the tea bushes. Keep the drainage system free flows by removing all the restricting points during cold weather. Spread the dig out soil evenly inside the planting ground.
- Application of insecticide should be taken up immediate after plucking either in the morning or, in the late afternoon hours by adopting barrier spraying technique.
- At the time of Pruning or Deep skiffing, leave some tea patches having succulence to trap the left over population of Helopeltis. Treat these bushes after one week with an approved systemic pesticide. Prune/skiff these treated bushes after 6-7 days of chemical treatment at the level of other pruned/skiffed bush.
- If the infestation is noticed in backend cropping season apply high MRL chemical like Thiamethoxam 25 WG @ 50gm in 200 l of water or, Thiacloprid @ 200 ml in 200 l of water in spot. Organic garden should apply neem formulation like Azadiractin 5% @ 135 ml in 200 l of water.
- Application of 10% water extract from leaves and succulent stem of common weeds like *Clerodendrum viscosum, Polygonum hydropiper, Cassia alata, Xanthium strumarium, Vitex negundo* etc are quite effective against this pest. 20 kg of the fresh leaves and succulent stems of these plants should be crushed and soaked in adequate water for around 36 hours. The filtrate of the soaked solution should be increased to 200 liters to get 10 % concentration of the original raw material in ultimate spray fluid. Apply this spray fluid immediate after plucking adopting barrier spraying technique at the morning/evening hours.

Red spider management:

Red spider is a major tea pest of the maintenance foliage causing notable crop loss. The following measures should be taken to control this pest.

- Take appropriate measure to improve the shade status in plain areas and low elevation of hilly plantation.
- Erect hedge plant like *Phlogacanthus thyrsiflorus* (Titaphool) to protect the road side plant from accumulating dust on the tea leaves.
- Uproot the alternate host weeds *Borreria hispida*, *Scoparia dulcis*, *Melochia corchorifolia, Fussiala suffruticosa* etc from the plantations to reduce the chance of building up of spider mites.
- If infestation is noticed in patches apply a round of high MRL acaricide Fenazaquin 10% EC @ 500 ml in 200 l of water or, Hexythiazox @ 80 ml in 200 l water at 15 days interval. Alternate acaricide should be sprayed in each round covering both surfaces of foliage.
- In organic tea plantations spray with Neem formulation like Azadiractin 5% @ 135 ml in 200 l of water.
- Crude water extracts of native plants as suggested for Helopeltis can be applied.

Looper Caterpillar management:

Looper caterpillar is a major chewing pest of tea plants. The young caterpillar eats the young leaves making holes at the margin of leaf blades. Mature caterpillar not only eats away both young & mature leaves completely but also eats the barks of the branches.

The caterpillar at the stage of pupa, pupate in the cracks & crevices of tea bush. The moths lay egg in the cracks & crevices of the shade tree trunk up to the height of 10'-12'. Peak egg laying is done during December-January & after hatching up spread over tea plants by making salivary thread. The looper caterpillar attacks the tea plant in mix broods. The following measures should be taken to control this pest during this quarter.

- Light trapping of moths should be done from October end to April-May.
- Heat treatment should be given around collar of the shade trees from November to March to destroy eggs.
- All the epiphytic plants grown on the shade trees should be removed.
- As soon as infestation is noticed during non plucking period on unpruned tea, apply a round of Flubendiamide @ 40 g in 200 l water. In case of pruned and deep skiffed teas it should be applied immediately after pruning and knife cleaning or skiffing, if any life population is noticed. Otherwise, caterpillars can survive initially eating on the barks followed by growing buds and thus causing a serious problem of recovery of the bushes leading to mortality.

Termite management:

- Infested tea bushes and shade tree trunks should be properly cleaned by removing the earth run. Fork the soil around the collar region before taking any chemical measure. Destroy termite mounds and queens.
- If the infested section is due for pruning, treat the bushes with Thiamethoxam 25 WG @ 50gm in 200 l of water *(250-300ml/bush) in* October- November and after completion of pruning 2nd round should be applied in January- February. A round of light irrigation is effective before taking up the chemical treatment for better penetration of the formulation in soil.
- Application of Matarhizium anisopliae, a fungal formulation is quite effective in termite management. Apply the 5% suspension of the formulation @ 250-300 ml/bush in collar region on wet soil within January- February.

Black rot disease management:

Black rot the fungal disease infects the mature leaves of the tea bushes. In cold weather this fungal pathogen reaches its dormancy and reappears in flushing period. The following measures should be taken up in black rot infected area in cold weather.

- Apply COC @ 500 gm in 200 l of water targeting the under surface of the infected leaves and cracks and crevices to eradicate the chance of sclerotia formation (winter dormancy of the pathogen) in cold weather.
- Application of COC on pruning litter is advisable to get good control over the pathogen of black rot. Apply lime wash on the pruned bush frame.

Red rust disease management:

- Predisposing factors such as inadequate shade, water-logging, low soil potash, improper soil pH, overgrown green crop etc should be taken care of.
- If brick red colored rusty sporulations in young stems and mature foliage is noticed, apply Copper oxychloride @ 500gm in 200 l of water (HV) in four rounds, first 2 in15 days interval and remaining 2 round i monthly intervals.

List of CIB/TRA/PPC approved Agro-chemicals for use in Tea as on 30th September, 2017

Name of Chemicals	Trade Name	Name of manufacturer	Dose		MRL (ppm)			Pre Harvest Interval (Days). As per PPC Ver. 9
ACARICIDES			**HV**	**LV**	**India**	**EU**	**Japan**	
Cyflumetofen 20 SC	–	–	1:500	1:250	–	–	–	–
Dicofol 18.5 EC	–	–	1:400	1:200	5	20	3	**16**
Ethion 50 EC	–	–	1:400	1:200	5	3	0.3	**10**
Fenazaquin 10 EC	–	–	1:400	1:200	3	10	–	**12**
Fenpyroximate 5 EC/SC	Mitigate	Isagro (Asia) Agrochemicals Pvt. Ltd.	1:2000	1:1000	0.2 BT* 2.0 GT*	0.1	40	–
	Pyromite	Excel Crop Care Ltd.	-do-	-do-	-do-	-do-	-do-	-
Hexythiazox 5.45 EC	Endurer	Coromandel International	1:2500	1:1250	1	4	35	**12**
Propergite 57 EC	Mastamite	Chemtura Chemicals India Pvt. Ltd.	1:400	1:200	10	0.05	5	**20**
Sulphur 80 WP	–	–	1:200	1:100	–	–	–	**10**
Wettable Sulphur 40 WP	–	–	1:200	1:100	–	–	–	**10**
Spiromesifen 240 SC (22.9 w/v)	Oberon	Bayer Crop Science Ltd.	1:1000	1:500	–	–	–	–
Etoxazole 10 SC	Etoxazole	Sumitomo Chemical India Pvt. Ltd.	1:1600	1:800	0.01	15	15	–
INSECTICIDES								
Azadirachtin 5% EC	Ecotin	P.J. Margo	1:1500	–	–	0.01	–	–
Bifenthrin 8% SC	–	–	1:1600	1:800	0.05	5	30	**5**
Clothianidin 50 WDG	Dantotsu	Sumitomo Chemical India Ltd.	1:4500	1: 2250	0.2	0.7	50	**14 – 21**
Deltamethrin 2.8 EC	Decis	Bayer Crop Science Ltd.	1:2000	1:1000	2	5	10	**10**
Phosalone 35 EC	–	–	1:400	1:200	–	0.05	15	–
Quinalphos 25 EC	–	–	1:400	1:200	0.01	0.05	0.1	**20**
Quinalphos 20 AF	–	–	1:400	1:200	0.01	0.05	0.1	–
Thiacloprid 21.7 % SC	Alanto	Bayer Crop Science Ltd.	1:1000	1:500	5	10	30	**7 – 14**
Thiamethoxam 25 WG	–	–	1:4000	1:2000	–	20	20	**10**
Emamectin Benzoate 5% SG	Missile	Crystal Crop Science Ltd.	1: 2500	–	–	0.02	0.5	**7**
Fenpropathrin 30 EC	–	–	1:1600	1:800	–	2	25	**8**
Flubendiamide 20 WG	Takumi	Rallis India Ltd.	1:5000	–	–	0.02	50	**30 – 40**
Thiamethoxam 12.6% + L- Cyhalothrin 9.5%	Alika	–	1:2666	1:1333	–	–	–	–
HERBICIDES								
Glyphosate 41% SL	Globus	Nagarjuna Agri 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-	-do-	–
	Run out	G.S.P. Crop Science	-do-	-do-	-do-	-do-	-do-	–
Glyphosate (Ammonimum Salt) 71% SG	Excel Mera	Excel Crop Care Ltd	1.5 kg/ha for broad leaf, 2.0 kg/ha for mixed population	–	1	2	1	–
	Safal	Tropical Agrosystem (India) Pvt. Ltd.						
Glufosinate Ammonium salt 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	–	0.25kg a.i./ha	–	0.2	0.05	–	–
Paraquat Dichloride 24% SL/ WSC	Herbucsone	Ankar Industries	500 ml – 1 L/ha in 200 lit of water	–	0.05	0.05	0.3	**7**
Carfentrazone ethyl 0.43% + Glyphosate 30.82 EW	Glyfinity	FMC India Pvt. Ltd.	3000ml in 500 lit water/ha	–	0.02	0.02	0.1	–
				–	1	2	1	

FUNGICIDES								
Copper Oxychloride 50 WP	–	–	1:400	1:200	150 as Cu	40	–	**7 – 14**
Carbendazim 12 % + Mancozeb 63% WP	–	–	1:400	1:200	0.53	0.1	10	–
Hexaconazole 5 EC	–	–	1:1000	1:500	0.02 BT*	0.05	0.05	**12**
Propiconazole 25 EC	Tilt	Syngenta India Ltd.	1:1000	1:500	0.1	0.05	0.1	**14**
Spray adjuvant (Sticker) recommended by TRA								
Magic Shakti	–	Nivshakti Bioenergy Pvt. Ltd.	20 ml in 200 L spray fluid	–	–	–	–	–
Nutrastick	–	Gassin Pierre Pvt. Ltd.	20-50 ml in 200 L spray fluid	–	–	–	–	–
Tip Top	–	Krishi Rasayan	100 ml in 200 L spray fluid	–	–	–	–	–
APSA 80	–	Amway India Enterprise (P) Ltd.	100 ml in 200 L spray fluid	–	–	–	–	–
Dhanuvit	–	Dhanuka Agritech Ltd.	120 ml in 200 L spray fluid	–	–	–	–	–
Active - 80	–	Modicare Ltd.	100 ml in 200 L spray fluid	–	–	–	–	–

**** BT = Black Tea * GT = Green Tea***