



**TEA RESEARCH ASSOCIATION
Arunachal Advisory Centre**

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QUARTERLY ADVISORY BULLETIN
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The Arunachal Advisory Centre, Tea Research Association, Itanagar is disseminating technical knowhow of tea cultivation among the tea growers of Arunachal Pradesh by issuing the series of the Quarterly Advisory Bulletin since January 2014. This is the 1st issue of the bulletin for the year 2016. We hope the tea growers of the state shall go through the bulletin and implement the advices in their tea fields during this quarter. We expect that the tea growers of the state will surely achieve splendid crop harvest during this year by adopting appropriate scientific approaches in tea cultivation.

Key points to be addressed during first Quarter:

- Get the soil tested and do the necessary soil amelioration if the test report has suggested. Prepare the fertilizer policy in advance on the basis of soil test report and pruning cycle average yield of your tea plot.
- Mulch the young tea ('0'- '+2' year old) area with any green material if it was not done in October-November to reduce the moisture stress faced by the young plants at the beginning of the season. Mulching also induces organic matter content in tea soil.
- Retain the pruning litters in the tea fields which will not only provide sufficient mulch on the pruned tea field for soil moisture conservation but also improve the organic carbon status of your tea soil.
- In plain areas level the ground to eliminate the chance of localised water logging during rainy season.
- In flat area deep hoeing should be done in mature tea sections between two tea rows within January to improve soil aeration followed by completion of levelling within February.
- Clean and re-grade the field and collector drains to ensure free flow of rain water in quick time from the planting ground. Evenly spread the drain bed soil inside the tea plot or, may be utilised for improvement of paths inside the tea garden.
- Clean the bed of contour drains and open the mouth of these drains in natural vertical depressions which serves as collector drain. Do not remove the vegetations from the lower bank of the contour drains and from both the banks of vertical depressions to protect soil erosion.
- Keep the plantation area weed free by taking special care in removal of secondary host plant of tea pest. At the same time take necessary measures in

preserving/growing the weed plants having pesticidal properties in the areas where soil is not suitable for growing tea.

- Lime wash the pruned bush frame with the formulation of 3 kg quick lime + 6 kg washing soda + 100 litres water to eradicate the mossy growth and to destroy the hibernation of pest in the cracks & crevices on the bush frame. Clean the lime washed bush frames with hessian cloth after 4-5 days of lime application. White washes the shade tree trunk up to the height of 10-12 ft to reduce the chance of egg laying by looper.
- Fork the soil around the collar region (15-20 cm apart from the sapling) of the 1-2 year old cockchafer prone young tea areas and collect the grub to arrest the infestation. In these areas turn the mulch in fortnightly interval to eradicate the chance of building up fresh population of cockchafer. Apply microbial formulation of *Metarhizium anisopliae* 5% cfu (250-300 ml/plant) in moist ground around the collar region of the infected tea fields within the month of February.
- Necessary shade lopping should be carried out in the *Helopeltis* infested areas to reduce the hibernating sites of the pest in the cropping season.

Management of Unpruned Tea:

- If plucking table is uneven with exposed stubs, a level off skiff (LOS) should be done within mid January without exposing any brown wood. If the table is at a uniform level remove the exposed banjhi shoots by hand at the level of plucking.
- Continue spraying of MOP 2 kg + Magnesium Sulfate 1kg + 100 litres water targeting the under surface of top 10-15 cm foliage by high volume sprayer at fortnightly interval till end February to reduce the effect of moisture stress in unprune bushes.
- If any sucking pests are still active which may be in patches, spray a round of TRA/CIB/PPC approved systemic insecticide through spot application.
- Pluck close to *janam* by adopting 7-days plucking round from the beginning of the season followed by breaking break of stubs of over grown shoots at the level of the table. Adopt liberal plucking in the patches having pockets on the table by allowing filling up these pockets at the earliest.

Management of Pruned Tea:

- Complete the knife cleaning operation (KCO) in LP teas before the emergence of new buds. Remove 1-2 Central knots and all the banjhi/ diseased branches from the frame during KCO without removing any productive parts from the bushes.
- In deep skiffed (DS) teas clean the bushes by hand. No maintenance foliage should be detached from the bushes if there is no severe infestation of mite pest.
- Monitor the pruned/skiffed tea fields regularly to protect from any incidence of sucking pest at the time of bud break. Need based spot application of TRA/PPC/CIB approved systemic insecticide is suggested if any infestation is noticed.

Tipping of Pruned/Skiffed Tea:

- The recommended tipping measures of different types of pruned and skiffed teas are as follows:

<u>Type of Prune/Skiff</u>	<u>Tipping allowance</u>
1. Light prune (LP)	20-25 cm above the cut mark (Depending upon growth & vigour of tea).
2. Deep skiff	2 full leaves (10-15 cm) above skiffing mark.
3. Medium skiff	1 full leaf (4-5cm) above skiffing mark.
4. Level off Skiff/Unprune	No allowance, pluck close to <i>janam</i> .

- Tip only full grown two and a bud from the newly emerged primaries at the pre-determined tipping height in weekly intervals to form the plucking table at the earliest.
- Tip the peripheral shoots about 1cm above the predetermined height for better ground coverage.

Management of Young Tea:

- De-centre the teas, planted in last October-November within mid February at the height of 20 cm from ground level retaining 2-3 laterals below that height. Thumb prune the single stemmer teas at 20cm from the ground level retaining good numbers of healthy foliage above that height. If foliage status of single steamer is weak and soil moisture status is poor thumb prune of single stemmer saplings should be delayed till inter flush dormancy period of April-May.
- Impart FFP-I in young tea plantation of +2 years (+3 years in high altitude) within mid January to mid February at the height of 35-40 cm from the ground level. During this operation remove only the twiggy branches from the centre without doing any defoliation of maintenance foliage. Pluck the new growth at the height of 65 cm (60 cm in high altitude) from the ground level.
- Execute FFP-II at the height of 40-45 cm from the ground level in +4 years (+5 years for high altitude) within mid to end January. Clean the pruned bushes by complete defoliation and removal of unproductive twiggy branches without making the central portion of the frame excessively hollow. Pluck the newly emerged primaries at the height of 65 cm (60 cm in high altitude) from the ground level.

Management of VP & Seed Nursery:

- Raise the VP/seed nursery of hilly areas in low elevation within the slope of 30% and the area should be protected by contour drains across the slope to check the flow of surface and sub-surface water. Prepare the sleeve beds of 120 cm width having any

convenient length along the contour line. Beds should be separated by 30 cm x 30 cm (width x depth) drains.

- Well drained areas with natural water resources nearby should be selected for nursery site in plain areas. Bed should be prepared 120 cm width with any convenient length. Beds have to be separated by 45 cm wide and 30cm deep drains and should be connected with nearby collector/main drain.
- The sleeve size should be 15 cm lay flat and 22.5 cm long filling up with sandy loam top soil having organic carbon percentage within the level of 1%. The pH range of the soil should be 4.5-5.0 and eelworm count per 10 gm soil should not be more than 6. Ensure these soil parameters through soil testing before filling up of sleeves.
- The top soil collected for sleeve filling should be sieved through 4 mesh sieve (4 numbers of hole/ square inch) and incorporate 500 gm SSP per cubic meter of sieved soil.
- Allow the filled up sleeves to settle down for a month period before planting of cuttings or sowing seed.
- Selected mother bushes should be light pruned within early January for collection and planting of semi hard green cuttings within mid April to June. Newly emerge primaries of mother bushes should be well protected from any pest/disease attack.
- Complete the seed sowing in ready sleeves within January by placing the seeds at 1cm depth by facing the eyes towards bottom. Carefully regulate the watering on seed sown sleeves to avoid the infection of *Fusarium solani*. Overhead shade is not required for seed nursery.
- Nylon net having the capacity to reduce 75% sun light should be used as overhead shade material in VP nursery. The frame of the overhead shade should be erected with adequate height and slope to avoid drip and heat damage. It should be 1.8 m and 2.7 m along lower and higher side of a roof covering one bed under one slanting roof. In hill slope overhead shade should be in flat structure with a height of 1.8 m.

Management of pest & disease:

Infestation of pests or infections of diseases are generally goes down in cold weather but residual population could build up rapidly in cropping period. The cultural, botanical, biological and chemical management practices of some major tea pests and diseases in cold weather are elaborated below for the benefit of the tea growers. Prior to elaborate discussion about the pest/disease management practices some salient features of the Plant protection Code (PPC) regulated by Tea Board of India (TBI) are scripted below and should be abide by the tea growers in every step of pest or disease management practices in tea.

Do's:

1. Follow Good Agricultural Practices (GAP) to maintain good health of your tea.
2. Apply all possible and safer methods of pest management like cultural, mechanical, physical, botanicals, biological etc to minimize the load of inorganic pesticides.
3. Procure and use only TRA/CIB/PPC approved pesticides and apply in appropriate dilution and maintain appropriate interval (minimum 7 days) between spraying and plucking to achieve maximum residue limit (MRL) of the applied chemical in made tea.

4. Use proper nozzle and maintain adequate pressure (40 psi for pesticide sprayer and 10-12 psi for weedicide sprayer) in conventional spraying machine.
5. As much as possible avoid blanket application of pesticide. Keep strict vigil on plantation for early detection of pest/disease occurrence and apply appropriate pesticide only on infested spot.
6. 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.
7. Use naturally available and TRA approved effective crude water extract of native plants as alternate of chemical pesticides for controlling pest & disease.

Don'ts:

1. Do not apply any chemical pesticide restricted or banned for tea cultivation.
2. 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.

Helopeltis

- In unprune tea (LOS) apply crude extract of *Polygonum hydropiper*, *Clerodendrum viscosum*, *Vitex negundo* etc @ 10% concentration is quite effective in controlling Helopeltis. Crush the leaves with tender stems and flowers of these beneficial weeds and soaked in water for 36 hours followed by straining through muslin cloth. The extract collected from 10 kg of such herbal mixtures should be diluted up to 100 litres by adding water followed by spraying.
- If any infestation still persists, remove the infested shoots. Apply a round of Thiomethoxam 25% WG @ 50 g in 200 liters or, Thiocloprid 21.7%SC @ 200ml in 200 liters of water in spot application by using hand sprayer. Adopt barrier spraying on the peripheral bushes of the infected area and then spray the inside bushes. Clean the nearby jungle to eradicate the secondary host of the pest.
- If necessary apply follow up round with Neem formulation @ 135 ml in 200 litres of water.

Red spider

- Take adequate measure to improve the shade status to reduce the propagation and infestation of Red spider. Eradicate the secondary host of this mite pest from the planting ground.
- Apply a round of Propergite @ 500 ml in 200 l water or, Fenazaquin @ 500 ml in 200 l water or, Hexythiazox 5.45% EC @ 80ml in 200 liters of water by using hand sprayer .
- Organic plantation can apply Sulfur 80WG formulations @ 1kg in 200 liters water. The botanicals suggested for Helopeltis can also be applied.

Thrips and Green fly

- Pluck hard if these pests are active at the beginning of the season. If necessary apply a round of Thiomethoxam 25% WG @ 50gm in 200 liters of water by using hand sprayer.

- Use Yellow Sticky Delta trap within these sections to reduce the infestation of these sucking pest. 10-12 Delta traps are required per ha of tea planting area. A photograph of such trap is enclosed at the end of this bulletin.
- The botanicals suggested for Helopeltis can also be applied.

Looper

- In looper infested sections heat treatment should be given around shade tree trunk, where eggs are laid, with flame (Mashal) up to the height of 12-15 ft to destroy the eggs of looper laid in the cracks and crevices.
- Use light trap with burning mashal inside the vacant spaces of the sections prone to looper to kill the moths during December to April.
- If very early stage of caterpillars is noticed on tea leaves, apply Quinalphos 25EC @ 500 ml in 200 litres of water. In case of bigger looper apply a round of Deltamethrin 2.8 EC @ 100ml in 200 litres or Bifenthrin 8 SC @ 125 ml in 200 litres of water by using hand sprayer.

Termite

- In termite infested LP and DS tea areas, remove the mud run from the bush frame. Dig out the termite mound noticed in and around the tea area and kill the termite queen.
- Application of fungal formulation, *Metarhizium anisoplae* 5% cfu @ 250-300 ml in soil around collar region of the infested tea bushes is quite effective for controlling termite.
- Apply Thiomethoxam 25% WG @ 50 g in 200 liters or, Thiacloprid 21.7%SC @ 200ml in 200 liters of water on the frame by spraying and around the collar region soil of infested bushes @ 250-300ml of aforesaid dilution can produce good control over termite pest.
- A light irrigation prior to take above treatments would be helpful for better penetration of the formulated fluid into deep soil.

Drainage management:

- The adequate drain spacing and depth recommended for tea plantations in terms of fully functional main drain system is as follows:

<u>Type of drain</u>	<u>Spacing</u>	<u>Width x Depth</u>
Field drain (Plain)	15 - 25 meter (Depending upon soil texture)	30cm x 90-105cm
Collector drain (Plain)	45 –55 meter (Depending upon soil texture)	45 cm x 120cm
Contour drains (Hill)	5-18 meter (Depending upon hill slope %)	30 cm x 30cm

- The excavated drain soil in plain area should be evenly spread inside the planting area keeping the drain side free for easy run off of surface water during rainfall. In hill slope spread the excavated soil towards the lower side of the elevation.

Management of Shade Nursery:

- Complete the preparation of seed bed within January. The well drained high organic Carbon enriched area with natural water resources nearby should be selected for shade nursery.
- Incorporate Dolomite @ 2 t/ha and decomposed cattle manure @ 25 t/ha at the time of final land preparation. At the time of final bed preparation apply 125 gm SSP/Sq. meter area.

Depth of sowing seed	:	0.5 – 1.0cm
Spacing from seed to seed	:	20cm
Interline spacing	:	30cm
Drain depth between two beds	:	60cm

- Lightly mulch the seed bed after seed sowing with green matter. Treat the mulch material with TRA/CIB approved insecticide to avoid the emergence of termite and other soil borne pest. Watering in timely interval is necessary to maintain soil moisture at field capacity level.

Photograph of Yellow Sticky Delta Trap:



Arunachal Advisory Centre, Tea Research Association,
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Wishes all the tea growers of the state of Arunachal Pradesh

A Very Happy & Prosperous New Year, 2016

List of CIB/TRA/PPC approved Agro-chemicals for use in Tea (as on 1st October, 2015)

Name of Chemicals	Trade Name	Dose		MRL (ppm)		
		HV	LV	India	EU	Japan
ACARICIDES						
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	1:2000	1:1000	–	0.1	10
	Pyromite	Do		–		
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	–	–	–
Wettable Sulphur 40 WP	Share	1:200	1:100	–	–	–
Spiromesifen 240 SC (22.9 w/v)	Oberon	1:1000	1:500	–	50	30
Etoxazole 10 SC						
INSECTICIDES						
Azadirachtin 5% EC	–	1:1500		–	0.01	–
Bifenthrin 8% SC	–	1:1600	1:800	–	5	25
Clothianidin 50 WDG	Dantasu 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
Profenophos 50 EC	Celcron	1:1000	1:500	–	0.1	1
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	Do				
Glyphosate 71% SG	–	1.5 kg/ha for broad leaf – 2.0 kg/ha for mixed population		–	2	1
Glufosinate Amonium 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	Herbucstone	1lit/ha in 200 lit of water		–	0.05	0.3
FUNGICIDES						
Copper oxychloride 50 WP	–	1:400	1:200	150 as Cu	40	-
Hexaconazole 5 EC	–	1:1000	1:500	–	0.05	0.05
Propiconazole 25 EC	–	1:1000	1:500	-	0.1	0.1