



TEA RESEARCH

Institute of Tanzania

Module
No.

6



Tea Pruning



Tipping

TEA PRUNING AND TIPPING

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FOREWORD

This is the sixth in the series of Training Modules prepared by the Tea Research Institute of Tanzania (TRIT). The first was on Rehabilitation of Abandoned Tea Fields, the second on Nutrition of the Tea Plant, Fertilizers and Manures, the third on Tea Plucking and Quality Control, the fourth on Weed Control in Tea Bushes and the fifth on Establishment and Management of Tea Nurseries. Pruning and Tipping are among major field activities in bringing tea into bearing. They stimulate growth of new pluckable shoots and formation of an even plucking table respectively. It is evident that, once pruning is maintained at a correct time and height, the tea bush can continue to grow new pluckable shoots and remain productive for over 50 years, given good health, other things being equal at *ceteris paribus*.

This module is meant to assist farmers, agricultural extension officers, tea estate managers and researchers in their efforts to prune and tip at correct time, correct height and to maintain a healthy manageable tea bush with constant growth of pluckable shoots. TRIT welcomes suggestions/opinions from users and readers of this and the other previous modules so that improvements can be made while updating them.

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Professor Bruno J. Ndunguru
EXECUTIVE DIRECTOR, TRIT

INTRODUCTION

Pruning is the cutting of branches of a tea bush at a pre-determined height and at a specified interval in order to reinvigorate and bring tea bushes within reach of the pluckers. Pruning rejuvenates the tea bush and brings it to growth of new pluckable shoots. Tipping is a method of breaking back the primary shoots developed after pruning to establish an even plucking table and bringing the field into production.

This training module provides the pruning standards, pruning procedures, after pruning operations, tipping and an annex of First Aid notes on accidentally cut wounds during pruning.

The topics are presented in chapter form to facilitate understanding the course materials. These include:

- Five chapters containing both theoretical and practical materials on pruning and tipping of tea bushes
- First Aid notes presented in Annex 1
- Instructions for course organisers, trainers and trainees (Presented in Annex 2 – 5)
- Exercise, Action plan and Evaluation sheets (Presented in Annex 6, 7 & 8)

This module has been prepared for trainers or facilitators to conduct theoretical and practical training sessions on pruning and tipping of tea bushes.

The guidelines are also developed for subject matter specialist for tea crop, supervisors and trainers of field staff to facilitate the training of frontline extension and development agents.

Some chapters need to be tailored in order to meet the education level of target groups and in house rules of particular companies.

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OVERVIEW OF PRUNING

Definition

Is essentially the artificial removal of the leaf bearing branches of the plant. It may involve all or more of the leaf bearing branches. The operation is aimed at keeping the size and vegetative vigour of the plant in a condition most conducive for maximum vegetative growth and cropping. Although every form of pruning puts a check on immediate growth, the fundamental characteristic is the imparting of a regrowth stimulus. Pruning generally involves the judicious removal of plant parts, dead or diseased branches and also any redundant branches according to the objective in view.



Plate 1: A pruned tea field

Function of leaves

The most important manufacturing organs of the tea plant. In the presence of chlorophyll (green pigment in the leaves), carbon dioxide and water react to synthesise sugar in the process called photosynthesis, which is dependent upon light and temperature. If there is insufficient light photosynthesis will decrease. As leaves become older they become less efficient at photosynthesis.

An efficient plant will manufacture more sugar than is needed for current growth and the excess sugar is converted into starch and stored in the root system. The stored starch is available at times when new shoots are produced after pruning or when only old and inefficient leaves are present on the plant.

Objectives of pruning

In mature tea, the plucking table rises with time it reaches unmanageable height and low yields hence a need to prune. Immature tea is pruned to form a frame and bring the young tea into bearing. The main objectives of pruning tea bushes are:

- Break dormancy for early growth;
- Protect young tea against moisture stress;
- Maintenance of a convenient height for easy harvesting;
- Stimulation of the vegetative shoot growth;
- Maintenance of the healthy frame;
- Effective utilisation of the hectrage and stabilisation of crops;
- Removal of diseased, dead and damaged material;
- Renewal an old frame;
- Encourage easy air circulation and light penetration within plants;
- Minimise formation of banjhi;
- Easy movement between plants.

Pruning styles

Pruning can be of several styles, each one imperceptibly leading into another. In pruning terminology 'low, deep, hard or heavy' are synonymous with extensive frame removal and 'high or light' with less frame removal.

Thumb nail prune, nipping

Is the removal of two leaves and a bud from plants in a Vegetative Propagation nursery, using a thumb and index finger.

Decenter or topping and centering

Plants which reach 30cm in the nursery may be cut – across at 15cm or young plants in a new clearing.

Maintenance pruning

Is the removal of all stems and leaves above the basic frame of the tea bush at varying intervals.

Cut across prune

The cut across is the 'highest' form of pruning employed in plantations. It is referred to as high cut across depending on the severity. Here, the top of the bush is cut level, usually about 55 -70 cm (22 to 28 in) above the ground level, with no selective cleaning of the frames being done. In this type of pruning a variable quantity of foliage would be retained on the frames. 'Cut across bushes' show quicker returns to active growth, and produce a greater part of the yield in the early part of the cycle.

Lung/breather/kicker prune

Lung prune leaves part of the tea bush intact to provide on going photosynthesis while the remainder recovers. The lungs/breathers/kickers are removed when the

tea bush has generated sufficient new shoots and are seen to be growing. The removal is done during tipping time.

This type of pruning permits adequate cleaning up of frame branches and could be of variable severity based on the height of prune. When the lungs are retained on the periphery of the bush, the style of pruning is called **rim-lung pruning**. When the lungs are retained in the centre of the bush it is referred to as **reverse rim lung** or **centre lung pruning**.

Clean prune

The mainframe branches are cut to a predetermined height above ground level with variable degrees of cleaning, but with the removal of all leaves.

Standard cut-across

A cut across prune normally made between 55-65 cm above the ground level.

Collar prune

A prune made at 15 to 20 cm above ground level. It is done when the problems like frost stem diseases injured the branches to an extent that only collar prune will help.

Slope prune

Pruning which follow the level of adjacent ground or follow the lie of the ground.

Mature prune

Any prune which takes place after immature pruning phase (first mature prune usually at 45cm (18") after 4, 5 or 6 years from planting.

Immature prune

Any prune prior to the first mature prune usually carried out to form a frame. Annual height increments "CREEP" about 5 cm (2") per year.

Up prune

A straight cut-across 1-5 cm above the previous prune with a maximum height of 65cm

Down Prune

Down prune is the term given to a prune that is carried out to reduce the height of the frame essentially to keep the plucking height to manageable levels.

After a number of pruning cycles, the pruning level may be so high that a plucking table reaches unmanageable level too soon. It is then necessary to lower the pruning level and start off a new series of pruning cycles. During the down pruning operation, attempts should be made to remove all diseased, dead and knotted branches

Tea can recover well from a down prune provided that the time of the down prune is correct. When down prune is delayed, the risk of poor recovery and death increases in an exponential manner for each week's delay. The reason for

this is that, the recovery after a down prune is slow because bud break from old wood take longer and unless there is substantial recovery from a down prune before the cold weather starts slowing down bud development and growth, thrips attack, in spite of stringent control measures, can be so serious that shoot growth is unable to grow away from the thrips with the result that many bushes die. Tea will recover well from down prunes as low as 30 cm, however, it must be remembered that the lower the prune, the older the wood and so the longer bud break will take, which mean that adhering to the time factor becomes even more important.

The yield in the year of down prune is related to the down prune height, i.e. the lower the down prune, the lower the yield but this low yield in the first year is compensated by higher yield in subsequent years, possibly because the frame has been invigorated with new wood.

The height of the first prune following a down prune is an important consideration. It should not be too close to the down prune or it will result to knot formation and likewise a high prune will result in the prune being on thin wood, which could inhibit yield. A fair compromise is to leave 5-10 cm above the down prune height.

Before the down prune, it is recommended that a higher level of potash than normal be applied to aid recovery. Since down pruning results in a large reduction in bush canopy, nitrogen levels can be reduced in the year of down pruning.

Skiffing

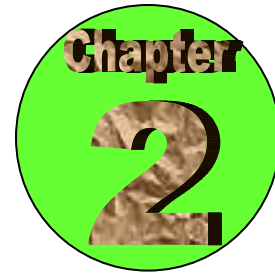
Skiffing is defined as very lights prune to level off a plucking table and sometimes used in place of a harder prune to extend the pruning cycle in mature tea. It is a slashing or levelling operation, which merely smoothens and reduces the plucking table by a few centimetres. It is the lightest type of pruning involving a high cut across. This is adopted at all elevations more as a tidying up operation than a prune. Skiffing is also adopted to prolong a pruning cycle or to delay a rush of crop. A light skiff is given in green wood only while a deep skiff is given between the last normal pruning level and that of tipping, into young red wood. Skiffing may be done to level –off the plucking table when the bushes have developed domed surface, which result generally from poor plucking. But an alternative procedure in levelling the domes is to stop plucking on the sides of the bushes until such a time as the outer shoot reach the same height at the central shoots.

Tools and equipments for pruning

1. A sharp pruning knife: used to cut tea branches. It is usually curved at the end;
2. Carborundum stone and water bottle: are used for sharpening pruning knives;

3. Measuring stick/tape: used as a pruning aid. It is marked on the height to prune;
4. Apron, gloves, boots and cap: are protective gears for pruners. They protect pruners from being injured by sharp sticks/ branches in tea fields;
5. First aid kit: contain all necessary equipments for first aid;
6. Pruning saw: used for down prune i.e. to cut off thick tea branches; and
7. Secateurs: for cutting thin branches, particularly in immature pruning.

For effectiveness and efficiency of pruning operation all the tools should be in the field when pruning is carried out.



PRUNING STANDARDS

Pruning cycle

Is the time interval between one pruning of a tea bush (once the formative prunes have been completed) and the next. In East Africa commercial practice is usually to prune every three or four years. The terms first, second, third and fourth year after pruning refer to the successive twelve months periods following the prune. The duration of successive pruning cycle may vary with location due to differences in climate, the Jat of the tea or clone, the style of plucking adopted and the nutrient status of the plants.

In the first year of the pruning cycle, yields are generally low, because bushes have to recover from the prune before plucking can resume and because it takes time for shoot numbers to build up and a ground cover to be established. As the cycle progresses, shoot numbers build up, average shoot size and weight diminish and growth rates slow down. The net effect is that 2nd year yields tend to be the highest, with the crop falling away in subsequent years.

The correct length of the pruning cycle is the one that gives the highest average yields. Management considerations and the type of tea dictate which cycle to be adapted. Once a decision has been made on length of the pruning cycle, a programme can be worked out (on large estates) to either prune $\frac{1}{3}$ or $\frac{1}{4}$ of the tea area every year.

In general, a cycle of four years is adopted for tea just above sea level with progressively longer cycle lengths of up to 6 years for tea up to about 7000 feet elevation. Once a pruning cycle has been decided upon, depending on the above factors, no *ad hoc* changes should be done as it will upset the other cultural practices and inputs which may not have been estimated for. Cycles of 3-4 and 4-5 years are practiced for low and upcountry tea respectively. Whenever possible a longer cycle is preferred, if the crop does not fall.

Time of pruning

The best time for pruning depends on local weather conditions and therefore varies from district to district. The time of pruning can have a significant effect on the recovery of bushes after pruning. Therefore, pruning should be undertaken when root reserves are high, after a few showers and when there is sufficient soil

moisture, although it will involve some loss of crop. Also, the timing should be such that tipping-in is completed and field back in production for the heavy flush. A tea field that has gone through a heavy cropping period (rush crop period) is in state of "exhaustion". If the field is pruned soon after such a heavy cropping period, the recovery can be affected even further. One should never attempt to prune a field soon after such a heavy cropping phase.

- Failure to adhere to the above recommendations may result in:
- Occurrence of more bush deaths;
- Lower response to applied Nitrogen;
- Higher crop loss due to thrips attack; and
- Slower recovery from prune

Pruning Heights

Pruning height should be adjusted to suit the length of pruning cycle. Two facts have to be considered when determining the pruning height and these are:

- The rise between prunes must be sufficient to avoid the formation of knots of callous tissue or clubs at the end of branch and reduce the development of shoots.
- The pruning height must not be so high as to make plucking difficult in the last year of the cycle.

Pruning level should be raised gradually. Experience has shown that a rise of 2 to 5 cm between prunes is just sufficient to avoid the formation of knots at the pruning height and that a pruning height higher than 65-70 is likely to lead to plucking problems in the last year of the cycle.

Thus with an increase in height between prunes and a maximum optimum height at which to prune, there must come a time when a prune has to be done to lower the pruning height to a workable level.

Factors governing pruning heights

- Existing height of bushes;
- Last pruning and tipping heights;
- Health and vigor of bushes;
- Incidence of pests and diseases;
- Frost or hail damage; and
- Anticipated crop during first year.

Pruning Techniques

Pruning is essentially a manual operation, which requires a certain degree of skill to ensure that the pruning height parameter is being followed and also that the cuts should be clean and that the wood is not split.

The pruning cut should always be made with a sharp knife so that the cut obtained is short, smooth, at an angle of about 45 degrees and sloping inwards and preferably close to the bud so that rainwater drains off the cut and does not remain to induce branch dieback.



Plate 2: A smooth cut sloping inwards

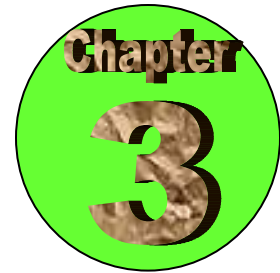
So often it has been observed that workers, in particular towards the end of their task, tend to use brute force to cut the wood, rather than taking a little time off to sharpen their knives to ensure clean cuts.

No bud break will take place above the lower end of a split branch and so die back is inevitable. Splitting of branches when down pruning must be avoided. Split branches also predispose the bush to attacks from stem disease that are becoming more and more prevalent i.e. wood rot *Hypoxylon serpens*, Thorny stem blight and branch canker.

In order to allow labour to complete their task in a reasonable time, it is incumbent on management to give the pruners good knives and adequate sharpening facilities. It is our experience that a pruner can complete this task well, i.e. no splitting of branches, and in good time, when he has been shown how much easier it is to prune with a sharp knife, when compared to the use of brute force with a blunt knife.

For the guidance of the pruners, a few simple and definite guidelines should be given as to the particular style of work expected and to prevent occurrence of injury during tea pruning. Pruners are advised:

- To adhere to pruning techniques and skills as detailed above;
- To prune as safety away from each other as possible;
- To stand in posture with a preventive manner;
- To hold the knife in a direction away from common sites of the body, i.e. arms, hands, fingers, legs and toes which may be affected;
- To keep pruning knives well sharpened all the time; and
- To make cuts short, smooth and sloping inwards while following the pruning height parameter.



PRUNING PROCEDURES

Different stages of pruning

Pruning in the nursery

There are advantages and disadvantages of pruning when the plants are in the nursery. One advantage is for plant to form low frame early. This can be achieved fully when the space between the plants is increased. Disadvantage of pruning in the nursery is that it will reduce the potential root development before transplanting. This can be solved by pruning six weeks before transplanting is due. It is best to prune ahead of transplanting so as to avoid giving the plant double stress, i.e. pruning stress and transplanting stress. Avoiding excessively tall plants can be achieved by nursery management practices such as:

- Adjusting the planting time of clones known to be vigorous;
- Reducing the quantity and/or frequency of fertilizer application;
- Adjusting the shade thinning procedures; and
- Moving the plant at two months intervals.

Pruning young tea

In the first years in the field, the vertical growth habit of tea needs to be checked so that it produces low, spreading branch structure and the tea canopy quickly fills the empty space between plants. Pruning in young tea also known as formation pruning or bringing into bearing, stimulates the production of lateral branches, the frame that is developed becomes the permanent frame of the bush. Pruning in young tea can be achieved also through bending and pegging although it is a labour intensive, requires continuous monitoring and may also predispose plants to diseases like (phomopsis) stem and branch canker.

Pruning young tea should be done at correct time, it is recommended to be done before the dry season as it reduces the bush's demand for water and while depletion of starch reserves has not occurred.

Pruning mature tea

Pruning of old tea deserves special treatment compared to the more recently planted clonal teas because of the extreme debilitation and wood rot which has resulted over several cycles of hard pruning. Hence in ageing seed tea areas, not

earmarked for replanting in the near future, appropriate pruning method should be employed as a means of bush renovation.

Plantations in the high country have over the years pruned the tea at 20-30 cm which delayed recovery, resulted in poor frames and even caused death of bushes. To avoid casualties and obtain quicker recovery a lighter form of pruning at 40 cm is advocated for high grown tea. Where there is accumulation of wood rot and cankered branches due to faulty pruning in the past, it may be difficult and not desirable to clean out the frames in one operation. In such instances, the renovation should be phased over 2 or 3 cycles. Thus while maintaining the height of the prune of about 40 cm through out the field, individual bushes with extensive wood rot and die back could be pruned low or the affected branches removed or the combination of both practices adopted effectively with advantage without much loss of crop. Once renovation of primary branches has been affected in this manner successive prunes have to be done at a higher level so as to increase the cropping potential by increasing the length of the stem on which the buds could develop and which will increase the number of flushing points thus contributing to higher crop. A lower prune should then be resorted to only when there is sufficient justification to do so perhaps after 3 or 4 prunes when the height becomes unmanageable. Bushes in a weak condition will not respond to the same extent and will have to be treated less drastically if recovery is to be satisfactory and deaths avoided.

Pruning Operation

As a guide to pruning at a correct height, a stick, clearly marked or notched at the pruning height, should be placed vertically in the centre of the bush and two or



three branches pruned at the indicated height. Due to possible change in ground height, either because of accumulation of organic matter or soil erosion, it is recommended that this height be checked against the previous pruning cuts and adjustment made to achieve the required pruning height. The rest of the branches are then pruned at the correct height, using the already

Plate 3: A stick placed vertically in the centre of the bush

pruned branches as a guide. The pruning stick can be pushed into the bush at a level of the already pruned branches, adjusted so that it is parallel to the ground, and used as a guide for pruning the rest of the bush.

On sloping ground the pruners should use a horizontal stick with two upright sticks fastened to it at a distance apart equal to the distance between the rows of tea and with the height of the horizontal stick equal to the required pruning height. This frame is then placed over the bush with one of the upright sticks higher up the slope than the bush and the other upright on the slope below the bush. The horizontal stick will then be parallel to the ground slope and at the correct pruning height.

Physiological and root growth studies and observations of the various treatments tested in the experiments have shown that in central and southern Africa:

- Pruning or tipping will check root growth and development
- Pruning is the best management practice available to induce frame formation
- Pruning at the correct time will protect the plants from moisture stress
- All young plants are susceptible to moisture stress but plants in the fourth to eighth year period are most susceptible

The recommendations that follow are appropriate for both dry land and irrigated regimes:

- Always aim to carry out the first prune six to seven months from planting. If, however, the plants are not fully established, due to say late planting, delay the first prune
- Where a delay in the timing of the first prune has been necessary, it is best to skiff the plants down to 55 cm, plucking at 60 cm to encourage some lateral growth low on the main stem
- Pruning height are largely determined by the height at which the permanent frame is to be established i.e. the frame that is to support production until the tea is uprooted or a very severe down/rehabilitation prune is carried out.
- To suit the spacing and population recommendations, a permanent frame height of 40 cm ensures ground cover and flexibility over pruning management at maturity
- Frame formation prunes are carried out below the permanent frame height level starting at 30 cm and rising in the approximate equal steps at each subsequent prune
- If there is no leaf on the branches left after the first cut, check on management inputs in respect of weed control practices and mulch application
- Decentring replaces the first prune
- Decentring should be done so as to remove the strong central growth down to a level that does not significantly reduce the ground cover of the lateral branches, which are left uncut
- A decentre cut below 10 to 25 cm usually meets this requirement and bushes must be treated on individual merit. Decentring is a skilled operation and so it

must be left in the hands of a few well trained operators and if this cannot be guaranteed then it would be best to stick to the standard cut across method.

Labour requirement and record keeping

Before pruning operation, identify fields, which are due for pruning and note the type of pruning. From this, work out how many mandays are required for pruning and therefore the dates for starting the operation. The labour requirement for normal pruning will be about 40-60 mandays per hectare but when extensive cleaning out or sanitary pruning has to be done, the labour requirement will be higher. Unskilled labour must be trained properly before the pruning operation.

Pruning is one of the activities that must be well documented in the field books. For each field, the date and height of pruning should be recorded as well as the number of man days required to complete the operation.

Resting of tea fields

Pruning removes the substantial amounts of leaves and branches which result in a drastic reduction in photosynthesis which curtails the amount of food that is transported to the roots; besides, the roots, particularly the feeder roots, also consume large amounts of carbohydrates by respiration.

Recovery of a tea bush from such drastic operation, as pruning is dependent on the state of health of the plant as well as on the amount of reserves present. The amount of reserves that the bush is capable of storing is dependent on the rate of growth of the bush. Such fields have become “tired” due to the natural process of ageing as well as due to various deficiencies in the management inputs. Many such fields are being harvested, most often plucked hard and then subjected to a drastic prune, without any intervening rest period, so that there has been hardly a chance of good frame development.

One should also seriously consider resting of fields, after the prune. Delaying tipping could help in the new shoot to undergo adequate secondary thickening. If the bush is brought into harvest too early whatever products of photosynthesis manufactured by the foliage formed on the bush will go mostly into flush production and relatively less amounts would become available for the thickening branches. The thickness of the new stems produced upon the bush that is tipped and plucked in the normal manner is smaller than upon a bush that is rested after pruning. This is a specific recommendation for those fields that had been subject to various forms of stress over the past cycles and where the frames have got badly debilitated. The suggested rest is to delay harvest by about 6 to 8 weeks compared to the normal healthy fields. Initially the worst fields should be rested. Pruning should not be too drastic and when necessary the cuts should be just below the “knots”.

AFTER PRUNING OPERATIONS

Consequences of pruning

Pruning exposes the bark of the frame, which has been shaded for 3 to 5 years. Such tissues are liable to scorch after short period of exposure to direct sun, due to rise of temperatures which can be about 10 to 15^o C above ambient air temperatures. Shaded leaves when exposed to the sun after pruning also get scorched within a few hours. Removal of shade trees can therefore accentuate scorch of branches and leaves. Thus, over several cycles of pruning, the scorched areas can increase and effectively reduce the number of emerging buds leading to a weakening of the bush, wood rot and reduced crop. Low bending also renders the frame more liable to sun scorch after pruning, particularly in the absence of shade.

Pruning, once the tea is fully covered the ground, has to be considered the necessary evil in tea management. Necessary, because if tea was not pruned the plant would soon outgrow the height at which plucking is possible. Evil, because there is a period of no crop following a prune, pruning is expensive and pruning result in the sudden exposure of the frames to the hot sun which predisposes the branches to sun scorch.

Bush sanitation



Plate 4: Bush sanitation after pruning

The question of bush sanitation is very much a management decision. It is best to keep pruning and bush sanitation separate, with the pruning being done at a constant height, followed by a trained gang who complete the sanitation. Whenever bush sanitation is done, a trained gang under close supervision must carry out the work.

It is at pruning time that all weak and debilitated branches, cankers, knots, snags and rotted branches are removed from the frame of old seed tree. Moss and licken jackets are also usually removed at this time.

In the management of perennial pest like the shot –hole Borer and the low – country live-wood tea termite, timing of pruning, bush sanitation and the painting of pruned cuts with fungicidal paints and the water sealer are advocated, in addition to the use of tolerant clones.

Shading Frames

The frame of the bush after being completely shaded from the sun by the top hamper is suddenly fully exposed to the sun following pruning and unless protected immediately, branches will be damaged by the burning action of the sun. This damage, while not immediately visible, occurs very soon after the frames have been exposed.

The quickest and most effective way of protecting the frames is to cover them with some of the pruning litter the same day. The pruning litter should be left on

top of the bushes until bud break when it should be removed and placed on the ground below the frames.



Sun scorch can be seen in many fields of tea and there can be no doubt that this sun damage will reduce the yield potential. The actual yield loss is impossible to quantify, but when it is remembered that there is no flow of plant nutrients in that part of the stem that is damaged, it seems

Plate 5: Pruned tea bushes covered with pruning litter.

reasonable to assume that the yield loss will be significant.

In view of this and the fact that protection against sun damage is so straightforward it is strongly advised that as a matter of routine, frames should be covered with prunings immediately after the prune, as a protection against sun scorch.

Pruning Litter

In the unpruned years, the soil in a field of mature tea is completely protected from the destructive action of sunshine and raindrops. Pruning of course removes this protection, but continued protection can be assured by following the recommendations given above, i.e. cover the frames of the bushes with pruning litter and place the pruning litter on the ground below the bushes when it is removed at bud break. The prunings must never be removed from the field. They

help to suppress weeds, prevent soil erosion, improve soil structure and on decomposition they release large amounts of plant nutrients into the topsoil then the nutrients become available to the pruned bushes.



Plate 6: A pruner placing pruning litter on the ground

Research has shown the value of pruning trash after a four-year cycle will add N-60KGS/ha/yr, P-10KGS/ha/yr, K-50kgs/ha/yr and many other micronutrients.

When the tea is mature it should therefore be possible to keep the soil permanently protected from the destructive action of sunshine and raindrops. However, pruning litter is an attractive, easily available fuel and experience has shown each year more

and more heads load of pruning litter go up in smoke in the village neighbouring tea fields. It is known how difficult it is to stop the theft of pruning litter and it is naive to think that it is controllable. It is well worth remembering that the pruning litter can be looked upon as a crop. Farm owner has paid for fertilizer and paid to harvest it (pruning) and this crop, if left in situ, will not only protect the soil from sunshine and rain drops, it will also maintain the soil's organic matter status and help to recycle the major and minor nutrients essential for the well being of the tea plant. These are all very good reasons for farm owner to do everything they can to keep the removal of pruning to a minimum.

Recovery from pruning

Satisfactory recovery from pruning and productivity of bush will depend on the



Plate 7: Recovery from pruning

style and severity of prune, state and activity of the root system and its reserves, time of pruning in relation to crop, state of health/debilitation of bush which is the reflection of previous pruning practices, nutrition of the bush, condition of the soil, rainfall distribution, temperature etc.

The speed of recovery from pruning of a bush depends on the plant's starch reserves in the roots.

The more starch reserves there are, the faster will be the recovery from the prune. Potassium deficiency, in particular, has a very marked effect on recovery.

Disease and Pests related to pruning activities

After pruning the tea bushes are likely to be attacked by pests and diseases, however, it is not common in Tanzania. The common pests being experienced in Malawi are:

Thrips (*Scirtothrips aurantii*)

Thrips are the most important pests affecting tea after pruning. Damage is caused by them feeding on the tender new growth, particularly in parts exposed to most sunshine. Infestation results in leaf deformation, browning and defoliation. When late pruned tea is severely attacked by thrips, tipping is considerably delayed, exposing stems to sunscorch and resulting in loss of yield. Young tea are most susceptible to thrips, if scouting reveals the presence of thrips, chemical control may be necessary. The following chemicals are recommended for control of thrips: fenitrothion, malathion and pirimiphos methyl. While there is no danger of taint on young tea not under plucking, the use of these chemicals on tea under plucking requires that the leaf from the next plucking should be discarded. However, all evidence indicates that the resulting crop loss is not significant provided the recommended pruning times have been adhered to.

Mosquito bug (*Helopeltis schoutedeni*)

Young tea and bushes recovering from prune are susceptible to mosquito bug damage. Feeding by this insect causes the appearance of dark brown lesions on young leaves and shoots. Feeding on green stems and branches can result in the formation of a canker above which dieback may develop.

Control of mosquito bug is often necessary in young tea or tea recovering from prune. Preventive sprays should be based, however, on presence of pest or damage in the field or nearby areas. The following chemicals are recommended for control of mosquito bug: endosulfan, pirimiphos methyl, fenitrothion and malathion.

Carpenter moth (*Tereagra quadrangula*)

The young caterpillars of carpenter moth develop on the pruning litter before migrating to the frame of tea bushes, feeding on the surface of the dry bark. For six weeks they feed on the bark, ring barking stem and branches, and finally making a hole into the wood of the feeding area as shelter. Research has indicated that the most effective method of control may be to spray the litter after pruning or down pruning before caterpillar migration starts.. Another advantage of control at this time is that there is no risk of chemicals tainting the leaf. Carbaryl is recommended for control of carpenter moth.

Stem and branch canker (*Phomopsis theae*)

This is a fungal disease which can cause a stem and branch canker on young tea plants. Water stress, in particular, predisposes plants to infection by

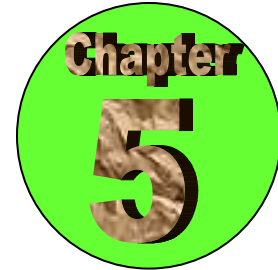
Phomopsis and this can be caused by failure to prune young trees so that they enter the dry season with an excessive amount of foliage.

Hot and cold disorder

This is a condition which is often seen on bushes recovering from prune. It is thought to be caused by the large difference between daytime maximum temperatures and night time minima. Leaves of new shoots on affected bush show marked curling distortion and chlorosis, particularly towards the margins. The disorder often result in shoot dieback and sometimes death of the bushes and is most pronounced in young plants (1 – 5 years old). Affected bush usually recover but the recovery from prune is slow and early yields are reduced.

Sunscorch

This is caused by the exposure of branches and stems to hot sun, usually following pruning. Raised bark temperatures causes death of the bark either in small patches or the length of the branch and is later followed by the affected bark cracking and peeling away. Such wounds may allow the entry of several wood rotting diseases. Severe sunscorch can occur if pruned stems are not shaded by prunings or if pruning is late and recovery from it is slow.



TIPPING

Tipping

After pruning, the new shoots originate at different height on the stems and form an even surface above the pruning level. Plucking on such uneven table is difficult and inefficient. Tipping-in at a fixed height above the pruning level enables all shoots emanating from the pruned bush to be plucked initially at a uniform height and thus establish a smooth plucking table.

Tipping-in is the operation after frame formation in young tea or maintenance pruning in mature tea before normal plucking is started. This entails the removal of three leaves and a bud above the tipping-in height after bud break and shoot elongation. The object of tipping-in after pruning is to produce a dense and upper level surface to the bush so that efficient plucking is possible and to leave an adequate depth of maintenance foliage on the bush. Normal plucking should not be started until a sufficient depth and density of maintenance foliage has formed to ensure the replacement of all the food reserves used up in the development of new shoots after the bushes were pruned.

Tools and equipments

Appropriate and enough tools and equipment should be made available before the start of the tipping-in:-

Measuring tape 3 metres

Measuring stick (fully length calibrated in cm from the ground or from pruned cut)

Basket (for collecting leaf from tipping-in)

Plucking apron

Plucking cape

Gum boots



Tipping height

Tipping shoots at a height retaining 2 mature leaves above the height of prune is a severe treatment considering the hard prunes adopted earlier because it has been shown that the upper two or three leaves in a shoot normally supply food material to the shoot above while the lower leaves in a shoot will supply food material to

Plate 8: Tipping

the root system and augment root reserves. Thus, leaving only 2 leaves at tipping time will result in the photosynthates moving to the developing auxiliary shoots and in the root reserves being depleted due to root respiration. Recently we have recommended that the shoots be tipped leaving 3 to 5 mature leaves above the pruning cut which is a height of 10-15 cm from the pruning level depending on growth habit. Early tipping or plucking –in should be discouraged as this will retard thickening of the stems although some early crop may be obtained by doing so.

On sloping ground, the tipping-in level should be parallel to the ground since the bushes would have been pruned parallel to the slope of ground. At least three rounds of tipping-in, at the same level, should be carried out on pruned bushes and five rounds on pegged bushes before normal plucking is introduced.

Tipping-in tips and timing

- Tipping-in should start before the shoots go banjhi
- Tipping-in should start when there are “three leaves and a bud” above the confirmed height and at least 50% of the tea bushes are ready.
- At the stage when the shoot growth at the bushes is still green and hence easy to break with fingers
- Tipping hard shoots is tedious and delays the tea bush to return into production
- A day delayed tipping-in means one less plucking day during the period of heavy crop
- Avoid tipping-in too early.
- Tipping-in should be carried out on slope using a tipping measure of the appropriate length, placed on the pruning level for up prune, ground measure for down prune and pegged young tea bushes.

The standard of tipping-in heights

- Up pruned fields 12 1/2cm above prune
- Down pruned fields 15cm above prune
- Immature tea fields 20cm above prune
- High pruned fields 10cm or below above prune (Pruned at 60cm or above)
- Pegged tea bushes 45cm from the ground

Ensure that tipping-in heights are recorded properly for future references

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PRUNING, TIPPING, PLUCKING HANDOUT

Tea Research Foundation (CA) Training Centre

Mulanje, Malawi.

FIRST AID ON CUT WOUNDS

Introduction

The commonest injury during tea pruning is CUT WOUNDS. Common sites affected are arms, hands, fingers, legs and toes. Bleeding and infection result, so first Aid is important.

Objectives

- To prevent occurrence of injury during tea pruning
- To prevent bleeding when cut wounds occur
- To prevent infection and contamination on cut wounds
- To assist dressing of cut wounds
- To transport patients with cut wounds to hospital effectively.

Wound contamination and infection:

Most cut wounds are contaminated. A dirt/contaminated may contain: blood clots, damaged tissues and sometimes foreign bodies. Bacteria cause further damage to cut wound tissue. The worst infection is tetanus.

How to control bleeding from a cut wound:

- Elevate the wounded site
- Clean the wound with antiseptic available e.g. Cetavlon
- Cover with gauze over the wound
- Dress with bandage under some pressure

If bleeding continues then do the following elevate the affected part further and apply a tourniquet on the limb proximal to the wound. Ensure it is tight enough to arrest any bleeding. The tourniquet can be a rubber band, piece of cloth, trouser belt etc.

If bleeding is severe or if the patient has lost much blood (+ ½ litre), then lie the patient flat and elevate his/her legs to assist circulation of blood to the BRAIN. This prevents SHOCK. Rush the patient to the nearest hospital

N.B.

Don't use a thin string or wire as a tourniquet.

Use a tourniquet only if bleeding is excessive and can't be controlled by dressing pressure

Release tourniquet every half an hour.

To let circulation to part of the tourniquet

To see if bleeding continues

If you don't release the tourniquet half hourly, the limb may become gangrene and result to AMPUTATION

Cleanliness is key to prevention of infection, including TETANUS and hence fast recovery.

Big cut wounds:

Fresh cut wounds heal faster than a delayed/dirt one. Fresh wounds take about 7 days to complete recovery. Delayed cut wounds take one month to heal. All cut wounds need to reach hospital within 6 hours from the time of injury.

How to dress a wound by a plaster

Clean the wound with a cetavlon and dry the skin around the wound. If it is a small cut wound use plaster without gauze for big wound cover with gauze and apply plaster on top.

How to dress a wound by using a bandage

Clean the wound with antiseptic e.g. cetavlon

Cover with gauze or pieces of bandages

Dress the wound by using a clean new bandage. The used bandages should not be used by another person (due to HIV infection).

Arms, apply armsling to prevent swelling

Ensure the bandage does not obstruct blood circulation

Small/minor wounds do not need dressing. Only ensure that are clean. Sometimes ligaments/tendons, nerves, bones are involved too. These need special attention at hospital level. Refer early after first AID.

Prevention:

- Train workers to prevent occurrence of INJURY during tea pruning e.g.
- Training pruning skills and techniques
- Each worker to prune away from others
- Standing posture
- Knife direction
- Prevent infection to all cut wounds
- Prevent Tetanus infection by referring patients to hospital for tetanus toxoid
- Prevent anaemia by control of bleeding
- Prevent labour lost days by proper FIRST AID and early referral to hospital
- Prevent complications of wounds by learning FIRST AID and applying the knowledge effectively
- Remember: Prevention is better than cure.

List of first aid kit

Plaster (1)
Bandages (4)
Gauze 10 pieces
Pair of Scissors (1)
Cotton wool (sufficient amount)
Armslings (3)
Safety pins (2)
Antiseptics e.g. Cetavlon
First AID Box

Annex 2

PRUNING OF TEA BUSHES

DATE

VENUE

DURATION: 2 days

COURSE TITLE: Pruning and tipping of Tea bushes

TARGET GROUP

Managers, Team leaders, Supervisors, headmen, Technical officers and extension agents.

NUMBER OF PARTICIPANTS

20 trainees per session

COURSE DELIVERY

The course will cover both theory and practical. 1 day will be spent for indoor workshop and 1 day for field practical. Where applicable, trainers will practically demonstrate all theoretically covered topics.

TRAINING METHODS

Participatory Approaches will be used in order to increase participation. Methods to be used are discussion in Plenary, Groups, Cards, Buzz groups, Drawings etc

TRAINING MATERIALS

Item	Quantity
Flipchart, Flipchart stand, Marker pens, Notebooks	2 rolls, 1, 2 box, 1 per each
My clear bag, Over head projector, PowerPoint Projector	1 per each trainee, 1, 1
Pencil, Pen, Transparencies, Masking Tapes	1 per trainee, 1 box, 3
Reams of paper, Handouts, Staple machine	3, One per each trainee, 1
Apron, Pruning knives, Pruning saw, Carborundum stone	5, 5, 5, 1
Measuring stick, First aid kit	5, 1

Annex 3

COURSE PROGRAMME

DAY 1

WHEN	WHAT	WHY
8:30-8.45	INTRODUCTION	
8.45-9.00	OPENING REMARKS TRIT representative	
9.00-9.30	PROGRAMME, PROCEDURES AND METHODOLOGIES	Trainees to get overview of the training programme
9:30-10:00	EXPECTATION AND FEARS	Trainer to get insights of the trainees
10:00-10:30	TEA BREAK	
10:30-11:00	COURSE OBJECTIVES	Trainees to understand the training objectives

11:00-11:30	OVERVIEW OF PRUNING AND TIPPING	Trainees to get the overview of pruning and tipping
11:30-12:30	PRUNING PROCEDURES	Trainees to know the procedures of pruning
12.30- 1.30	LUNCH	
1.30-2.30	PRUNING AT DIFFERENT STAGES	Trainees to know the different stages of pruning
2.30-3.30	AFTER PRUNING OPERATIONS	Trainees to understand the operations being carried after pruning

DAY 2

WHEN	WHAT	WHY
8:30-9:00	RECAP	Trainer to concentrate on parts not understood
9.00-9.30	FIRST AID KIT	Trainees to know how act in case of accident during pruning
9:30-12:30	PRACTICAL	Trainees to be equipped with practical skills
12:30-1:30	LUNCH BREAK	
10:00-10:30	EXERCISE	Trainees to remember what they learned
10:30-11:15	ACTION PLAN AND PRESENTATIONS	Trainees to prepare action plan to be implemented by themselves
11:15-12:30	COURSE EVALUATION	Trainers to know where to improve in future
12:45-1:45	CLOSING REMARKS The guest of honour TRIT representative	

Annex 4

SESSION PLAN

SESSION PLAN 1

TIME	CONTENTS	TECHNIQUES AND AIDS
15 Min.	INTRODUCTION	
15 Min.	Opening Remarks	
30 Min.	Programme, procedures and methodologies	FLIP CHART Q & A
30 Min	Expectations and Fears	FLIP CHART Q & A
30 Min.	Tea Break	
30 Min.	Pruning cycles and Programming Terminologies or types or styles of prune	Q & A CARDS "BRAIN STORM"

20 Min.	Participants to work in three groups: Pre-requisites for pruning Pruning check list The pruning plan	FLIP CHART, "HUM GROUP"
60 Min.	Presentation, Questions and Discussion	FLIP CHART
20 Min.	Tools and Equipment Pruning (Time) season Pruning heights	TOOLS & EQUIPMENT SAMPLES Q & A
40 Min.	Pruning samples Pruning techniques and skills	FLIP CHART "BRAIN STORM"
10 Min.	Storage of pruning tools and equipment Pruning records	Q & A
20 Min.		
60 Min.	Pruning procedure	FLIP CHART Q & A
60 Min.	LUNCH	
60 Min.	Pruning at different stages	Q & A FLIP CHART
60 MIN	After pruning operation	FLIP CHART PPP BRAIN STORM Tools & Equipment samples
	END OF DAY ONE	

SESSION PLAN 2

TIME	CONTENTS	TECHNIQUES AND AIDS
30Min.	RECAP	Q & A
30 Min	Health and Safety during pruning	Q & A First Aid notes and kit
180Min.	Depart for Field Visit and Practical pruning. Practical Tipping	Transport Tools and Equipment
60 Min.	LUNCH	
30 Min.	Excercise	Papers
45 Mln	Action Plan	Q & A Sheet
20 Min.	Evaluation.	Sheet
10 Min.	Guest of Honour to close course, sign and	Certificates

	present certificates of attendance to participants.	
	<i>END OF THE COURSE</i>	

Annex 5

PRACTICALS

PRUNING AND TIPPING

TOOLS: Pruning knives (with binding material) carborundum stones and a bottle of oil, File 30cm., Pruning Saws, Tape measure 3m., measuring sticks (calibrated in cm.), Basket (for collecting leaf from tipping-in), Protective gear (aprons, capes, gumboots and gloves) and First Aid Kit.

- SPECIMEN:**
1. A field which is due for pruning
 2. An abandoned field due for rehabilitation
 3. An abandoned field which has been rehabilitated and is due for tipping

TRAINEES TO KNOW AND PRACTICE:

Type of prune recommended for a particular tea bush

Pruning

Handling pruned branches

Handling a cut wound

Keeping pruning records

Tipping

Annex 6

EXERCISE

Name.....Date.....

1) Tick the right statement. Pruning should be undertaken when:

- a) Root reserves are low and there is sufficient soil moisture
- b) Root reserves are high and there is sufficient soil moisture
- c) Root reserves are low and after a few showers

2) Pruning level should be raised gradually. A rise of _____ cm each time has been found satisfactory.

- a) 1-2 cm
- b) 2.5-5 cm

c) 6-10 cm

3) The following are pruning equipments except:

- a) Measuring stick
- b) Pruning knife
- c) Pruning Basket

4) Define

a. Pruning

.....

.....

.....

b. Down prune

.....

.....

.....

c. Lung prune

.....

.....

.....

4) Differentiate the following terms as used in pruning

➤ Mature and Immature prune

.....

.....

➤ Collar and down prune

.....

.....

.....

- 5) Write T for the true and F for a false statement at the end of each sentence.
- a) The duration of pruning cycles may vary with locality, the Jat of the tea, the style of plucking adopted and the nutrient status of the plant. _____
 - b) The lower the prune, the younger the wood and so bud break will take long time. _____
 - c) Pruning, once the tea is fully covered the ground, has to be considered the necessary evil in tea management. _____
 - d) The pruning must never be removed from the field. _____

6) Mention one advantages and one disadvantage of pruning in the nursery.

(i).....

(ii).....

7) Why it is discouraged to use brute pruning knives?

(i).....
 (ii).....

8) Why it is encouraged for bush sanitation to be done immediately after pruning.

(i).....

9) Mr Santino is a tea farmer living in Mkonge village. He used to employ a labour to prune his tea field whenever the table reaches unmanageable level. He then attended a training course on Pruning of tea bushes. On implementing what he was trained he went to his field to measure the height of the last prune. He was confused when he discovers some bushes were pruned at 37cm, others at 40cm and others at 45cm. What advice will you give Mr Santino on the proper height to prune?

.....

ACTION PLAN

Name----- Organisation-----

Title-----

ACTION	EXPECTED RESULTS	INDICATORS	COLLABORATORS	BY WHEN
--------	------------------	------------	---------------	---------

Trainees should fill in 2 copies of the Action plan. One copy will be returned to the trainer while the other will help him/her in implementation.

Annex 8

COURSE EVALUATION

Your frank assessment is needed in order to improve future training.

1) Course objectives were:

1. Very relevant
2. Relevant in parts only
3. Not quite sure
4. Not at all relevant

2) Did the training course meets its objectives?

- 1. Yes
- 2. Yes in some but not all
- 3. Not quite sure
- 4. Not at all

3) Did the trainers meet your expectations?

- 1. Yes
- 2. Yes in some but not all
- 3. Not quite sure
- 4. Not at all

4) Level of understanding

Please circle:

- 1-Very Good
- 2-Good
- 3-Average
- 4-Bad
- 5-Very bad

	Rank				
Overview of pruning	1	2	3	4	5
<i>Pruning procedures</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
After pruning operation	1	2	3	4	5

5) Aspects of the programme

	Rank				
Plenary	1	2	3	4	5
Buzz groups	1	2	3	4	5
Group Discussions	1	2	3	4	5
Training Aids	1	2	3	4	5
Training materials and handouts	1	2	3	4	5
Tea, Lunch and sundries	1	2	3	4	5

Please tick:

6) What is your view on the subjects/Topics discussed?

Too advance too elementary

7) What was your feeling about the pace of the course?

Too fast Too slow

8) What are your views on the volume of trainers' voice?

Very clear Not clear

9) Were there any subject which

You felt it could have been omitted, if so which?

.....

You felt could have been included

.....

10) Do you have any comments/suggestions for future improvements?

.....

.....

.....