

5.2. Controlled burning techniques for peatland

1. Site selection

Selected site can be a land area covered with bushes and shrubs, or secondary forest that has a flat topography and size of 1 - 2 ha. Selected site should not be pristine peat swamp forests or those with high conservation values. Activities should be focused on areas that have been cleared or degraded.

2. Slashing

Slashing shrubs, bushes, undergrowth or trees with a diameter of up to ± 10 cm using machete is done at the height of ± 15 cm above the ground. It is done that way to reduce the time needed for slashing. Fuels produced from slashing are spread over the planting area.

3. Tree felling

Tree felling is cutting down the trees and cross-cutting the stems of trees with a diameter > 10 cm using machete, axe or hand saw. This step is carried out if the potential cultivated area is in the form of secondary forest. Tree felling is not required for area covered with bushes and shrubs.

4. Chopping

Twigs and tree branches are chopped into smaller parts to accelerate the drying process. Tree stems with a diameter of more than 15 cm are removed from the area to be further utilised for construction materials, household utensils, or fences.

5. Drying

Fuels, which have been spread evenly over the selected area, are allowed to dry under the sun for about 10 days, depending on weather condition. The drier the weather, the faster the drying process.

6. Construction of firebreak

To avoid uncontrollable fire, firebreak should be constructed around the planting area by making a strip of 1-2 m wide and clearing the strip from any fuels until the ground surface can be seen.

7. Construction of ditch and water pond

Because peatland is very vulnerable to fire hazards and peat fire spreads underground, it is necessary to make a ditch around the planting area to prevent fire from spreading underground. Ditch of 50 cm wide and about 60 cm deep is made around the planting area to maintain the water table of the peatland. In addition to that, at every 10 m, water ponds measuring 1 m x 1 m x 1 m should be constructed to serve as water reserves during dry season (see Figure 27). Water table needs to be maintained at 50 cm deep during burning period to prevent fire from spreading underground.

8. First burning

Burning can be conducted in two stages, i.e.: first burning and second burning. First burning is intended to burn fuels at initial stage after drying, while second burning is intended to clear the area from residual fuels, which have not been burned during first burning. The appropriate burning technique for peatland is ring-firing technique, considering that peat fire moves underground with very low speed. With this technique, fire can spread faster and in a controlled manner. At the selected area, a fire group of 2 - 4 people are needed, where 2 people (C and D) are positioned at one corner of the potential burn area, while the other 2 people (A and B) are positioned across C and D. Ignition starts simultaneously under one command, starting from 2 different points. A and B move in opposite direction while burning the perimeter. C and D will also be doing the same thing. In the end, B and D will meet at one corner, while A and C will meet at another corner across B and D (Figure 28).

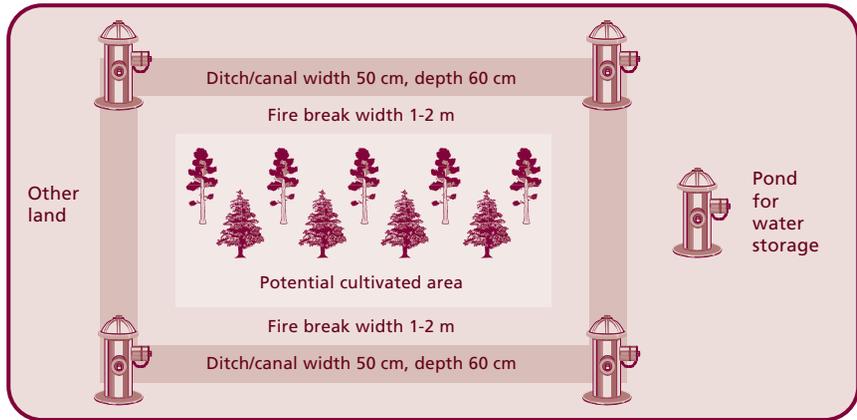


Figure 27. Land prepared for planting (peatland)

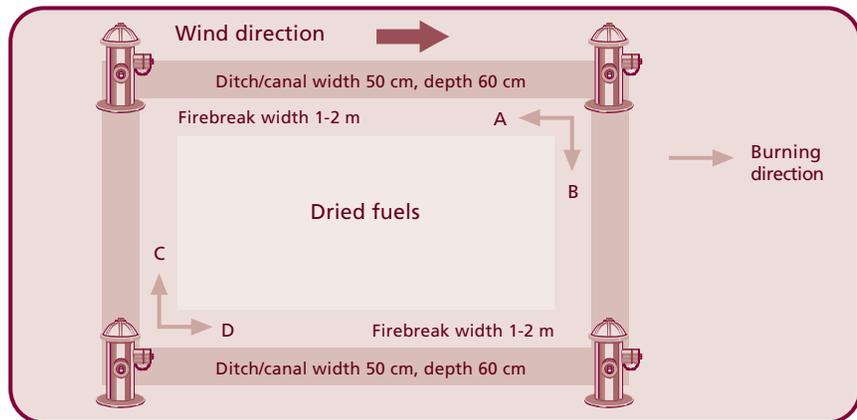


Figure 28. Controlled burning technique for peatland

9. Second burning

Second burning is conducted if there is significant amount of fuels left after first burning. Residual fuels are collected in one place in the planting area and burned. The ashes resulting from this second burning can be used as fertiliser for the planting area.

10. Hoeing

The burn area is then hoed to loosen soil clods. Hoeing is needed for planting aloe vera and other horticultural crops, such as tomatoes, eggplants, long bean and pineapple.

11. Construction of beds

For planting purpose, beds can be made with a size of 1.5 m x 10 m x 15 cm.

12. Dibbling

Dibbling is carried out on the burn area by making holes with a dibble.

13. Planting

Corn seeds are planted in the holes that have been dibbled. Seedlings for other crops, such as aloe vera, eggplants, tomatoes, long bean, chilli and pineapple are planted directly in the bed.

Flow chart of permanent agriculture practices on peatland is shown in Figure 29.

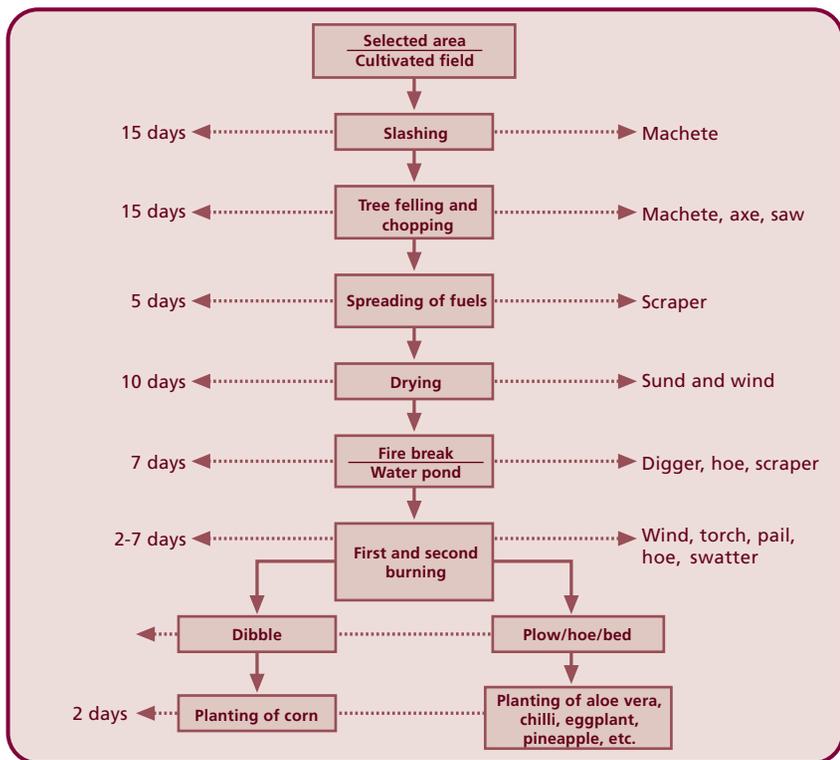


Figure 29. Flow chart for preparation of planting area on peatland

5.3. Controlled burning techniques for dry land

1. Site selection of planting area

Selected area can be in the form of primary forest, secondary forest, bushes, or even old rubber plantation. Before fuel preparation is conducted, area which will be cultivated should be clearly marked using wooden stakes put upright on the ground. The maximum area is 2 ha. After that, fuel preparation can be conducted. The steps in fuel preparation are slashing/tree felling, chopping, fuel reduction, and fuel drying.

2. Slashing

Slashing should be done at first to make tree felling easier. Slashing is cutting shrubs, undergrowth and trees with a diameter of up to ± 10 cm by using machete. Slashing is done at the height of 15 cm above the ground to reduce the time needed for slashing. Fuels produced from slashing are then spread over the planting area.

3. Tree felling

Tree felling is cutting down or felling trees with a diameter of > 10 cm by using machete, axe or hand saw. Tree felling is carried out only if the potential cultivated area is secondary forest. Tree felling is not required for land area with bushes.

4. Chopping

Chopping is cutting stems, branches and twigs of trees which have been slashed or felled into smaller parts to accelerate drying process. Small sized-fuels will burn out faster.

5. Fuel reduction

To accelerate the drying process, and to reduce the burning duration, the possibility of uncontrollable fire occurrence and the amount of smoke produced, the amount of fuels should be reduced. Fuel reduction can be done for instance by utilising valuable wood for building houses or huts,

building fence to protect the cultivated areas from wild animals, or making it into charcoal for sale. Another alternative of reducing the amount of fuels is using the litter from slashing/tree felling as compost, charcoal briquette, etc.

6. Fuel drying

Trees, stems, branches and twigs which have been cut or chopped, are dried for 3 weeks or up to 1 month or more, depending on local weather condition, condition of local vegetation and the amount of fuels. Drying is carried out to ensure that burning can be done faster and throughout the selected area and does not produce a lot of smoke. Characteristics of dried fuels are: 1) Dried leaves are easy to crush; 2) Stems and twigs are easy to break.

7. Construction of firebreak

To prevent fire from spreading to other areas, firebreak should be constructed around the planting area by making a strip of 2 - 3 m wide and clearing the strip from any fuels until the ground surface can be seen.

8. Fuel arrangement

Before burning is carried out, dried fuels should be arranged according to the burning technique. For back firing and ring firing technique, fuels should be spread over the potential burn area. For pile burning, fuels should be collected in piles, as many as 10 - 15 piles per hectare.

9. Choice of burning technique

Burning techniques (Figure 30 - 33) which can be used in preparing land for farming or cultivation are ring firing, back firing or pile burning. The burning technique should be determined in advance as the choice will affect the type of activities to be done. When using ring firing and back firing, firebreak around the potential burn area is absolutely necessary. When using pile burning, firebreak is less needed, because fuels are concentrated in one location.

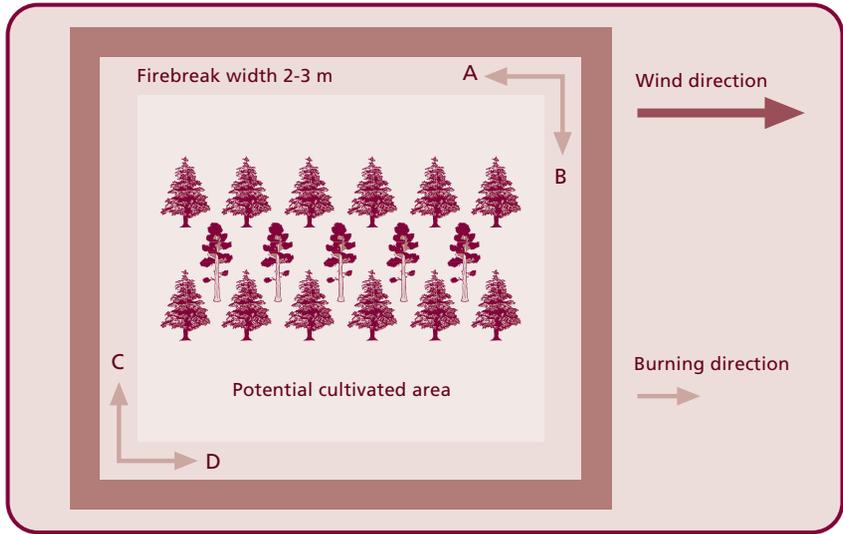


Figure 30. Ring firing technique with 4 torch people

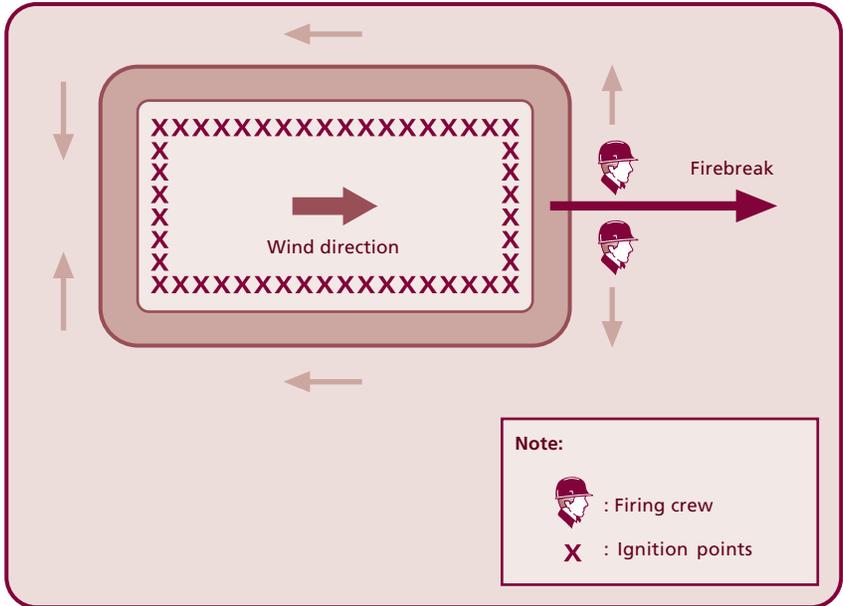


Figure 31. Ring firing technique with 2 torch people

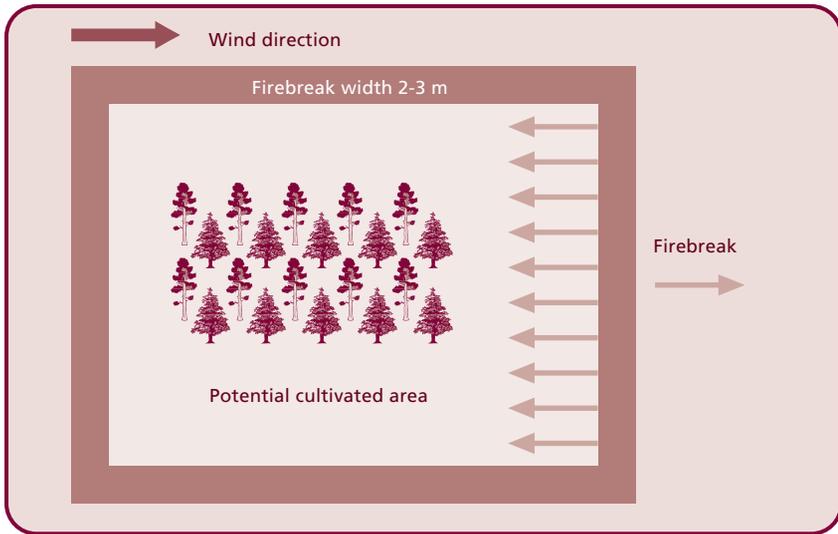


Figure 32. Back firing technique

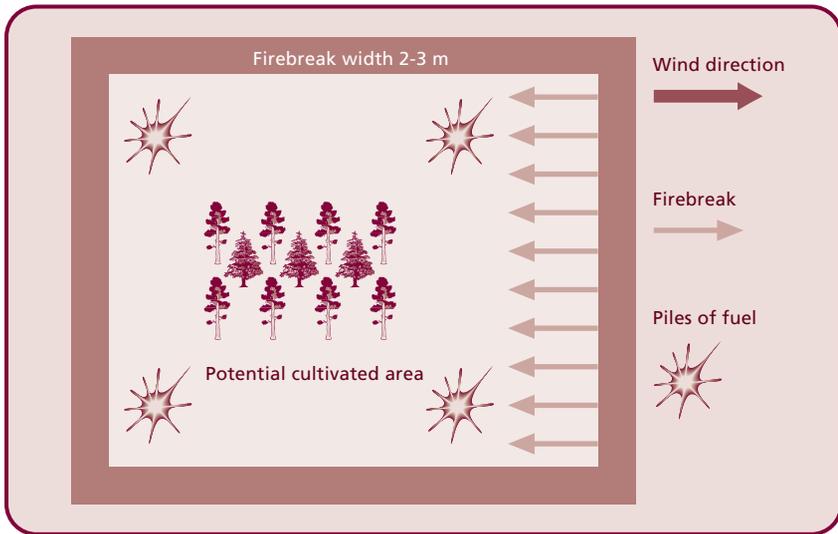


Figure 33. Pile burning technique

10. Burning

Every burning (ring firing, pile burning or back firing) technique starts from places opposite to the wind direction. Back firing in particular very much depends on the wind direction and wind speed. Ring firing technique requires at least 2 torch people. They are positioned at the side opposite to the wind direction. Burning starts at this point and moves along the perimeter. At the same point, one torch person will burn along the edge by moving clockwise until the two people meet at the side of the area where the wind is blowing. Fire is allowed to spread into the wind. Pile burning starts at the piles which are located opposite to the wind direction. Burning then moves to other piles that are closer to where the wind is blowing.

During the burning process, fire should be monitored jointly until the burning is completed to prevent fire from spreading outside the selected area or to a location that is not intended to be burned. After burning is completed and before the fire crew leaves the burn area, any smouldering materials and smoke plumes should be extinguished completely.

11. Hoeing

The burn area is hoed to loosen the soil clods. Hoeing is required for planting of perennial crops, such as coffee, staple crop, such as rice, or other horticultural crops, such as tomatoes, eggplants, long bean, groundnuts and pineapple.

12. Construction of beds

For planting purpose, beds with the size of 1.5 m x 10 m x 15 cm (size of seedbed can be based on local custom) are constructed.

13. Dibbling

For planting corn and rice, dibbling is carried out by making holes using a dibble.

14. Planting

Seeds for corn, rice, watermelon and cucumber are planted in the holes that have been dibbled. Seedlings for aloe vera, eggplants, tomatoes, long bean, chilli and pineapple are planted in the beds.

6. Recommendations for the Implementation of Controlled Burning Practices

Controlled burning is a method that can be used in land preparation for farmland cultivation and sustainable and environment-friendly agriculture. The following points should be considered to ensure efficient and effective implementation of controlled burning techniques:

1. There should be some regulatory measures, both at national and local levels, for implementing controlled burning practices among smallholders, farmers and shifting cultivators.
2. Efforts of the government in trying to convert shifting cultivation into permanent cultivation should be continued and further enhanced.
3. Controlled burning practices using permanent cultivation should be promoted to smallholders, farmers and shifting cultivators, particularly those still practising shifting cultivation.
4. The capacity of traditional community groups in practising controlled burning for land preparation should be strengthened.
5. There should be diversification of seasonal crops to perennial crops (such as coffee, aloe vera, etc.), so that land preparation by burning is conducted only once during the cultivation period.
6. There should be demonstration plots to provide a clear reference to the communities in practising controlled burning.
7. In the long run, research and studies on “no burning” and other alternative techniques for land preparation by smallholders, farmers and shifting cultivators should be explored and documented.

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