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Pruning as a production factor of the cacao tree (*Theobroma cacao* l.)

Abstract

Pruning is one of the main tasks that must be taken into account in the management of a cacao plantation. Its proper application stimulates production, facilitates the harvest of ripe fruits and the removal of fruits and organs diseased by Cacao frosty pod rot and Witches´ Broom. Essentially, pruning consists of removing suckers, branches that grow downwards and to the sides, intertwined branches, twigs that form inside the crown, and the tipping of upper branches to preserve the proper height of the trees.

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Introduction

The reproductive structure of the cacao tree is basically made up of the stem, primary branches and secondary branches. Floral cushions, flowers and fruits are formed in these organs (Figure 1).

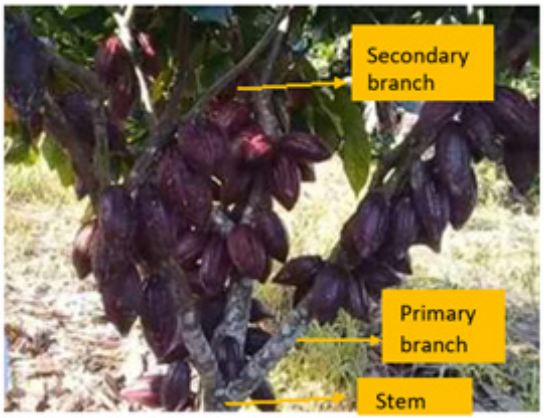

Figure 1 Reproductive structure of an adult cacao tree.

Vegetative growth is a function of nitrogen supply while photosynthesis (which depends on leaf area) determines carbohydrate reserve levels. In a simpler way, the relationship between nitrogen supply and carbohydrate reserves is the indicator of the number of fruits that reach maturity. This relationship is due to many external factors, mainly the leaf area of the tree and the carbohydrate reserves stored in the hardened wood.

Pruning has a direct impact on the supply of nitrogen and carbohydrate reserves and, as a consequence, on fruit production. In practice, only the foliage on the branches in the outer part of the crown performs photosynthesis, actually contributing to the carbohydrate reserves of the tree. All leafless branches found within the canopy are considered useless because they consume more nutrients than they store.[1]

Consequently, with proper management, the structure of the tree that is responsible for its production capacity should be stimulated, strengthened, and protected.

Pruning as a usual work

In the course of its growth, the cacao tree must undergo a training pruning that consists mainly of eliminating the so-called suckers (secondary stems), the branches formed below those that make up its structure and, also, the branches that tend towards the ground or to the sides (Figure 2). Thus an erect, well-formed tree is achieved.

Figure 2 Cacao tree before training pruning, 2A and after training pruning, 2B.

For its maintenance, the adult tree must be pruned in such a way that its structure is similar to that of an umbrella so that the roof has the maximum amount of leaf area available for photosynthesis and the branches, which are the organs where the fruits are formed should be keep covered by the foliage, avoiding their direct exposure to the sun (Figure 3). It is important to eliminate the twigs that form inside the canopy to facilitate the visibility and harvest of the ripe and diseased fruits and diseased organs that are found there. Other important factor that it should considerer is the height of the tree.

Figure 3 Adult cacao tree with adequate maintenance pruning.

The tree is trimmed to control its growth and prevent its height none exceed 3 meters. Mainly dry, intertwined branches and twigs that form inside the canopy and that prevent the visibility of the fruits should be eliminated. Crossing between the branches of neighboring trees should naturally be avoided.Pruning is used to remove all the fruits and organs mainly affected by the diseases Cacao frosty pod rot and Witches´ broom, thus avoiding that they remain as secondary sources of infection that generate new epidemics.

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Maintenance pruning is normally done at the end of the harvest, which coincides with the beginning of the dry season.

Figure 4 shows the general appearance of a cloned cacao crop subject to appropriate maintenance pruning. And Figure 5 shows in detail what is known as "hard pruning" consisting of the elimination of a large part of the leaf area of the trees and of already formed branches, severely affecting their productive potential.

Figure 4 Adult trees with adequate maintenance pruning. Agrícola La Nacional Farm, municipality of Támesis (department of Antioquia), year 2013.

Figure 5 Young trees subjected to heavy pruning, 5A. Young tree in production subject to heavy pruning, 5B.

Acknowledgments

None.

Conflicts of interest

Authors declare there are no conflicts of interest.

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