



TECHNICAL CHARTER OF GREEN PRUNING

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INTRODUCTION

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The Technical Charter of Green Pruning is a basic document on new pruning techniques. It is about the importance, benefits, advantages, impact on trees, quality, performance, production of trees during the current and the next year of tree's life. Theoretical training of farmers and specialists is about technical elements of pruning in spring, which includes the time when pruning is made in compliance with the species, varieties and pruning technique. A practical demonstration was made with farmers and specialists in some species, such as apple, pear, plum, cherry, etc. This process followed the theoretical and practical demonstration by experts. The experts made the demonstration, while participants, specialists and farmers put it into practice. Farmers and specialists made practical exercises.



The new Green Pruning technique was applied in our country in 2010 in the region of Diber. This new technique was applied before in France and it proved to be successful in the fruit production. Green Pruning is the process of tree pruning in the season of spring, during vegetation period. The green pruning was not known in our country. We used to do the pruning in winter only. This experience was enabled by ADAD (Association for Development of Agriculture) and supported by FERT (Professional Organization of French producers in France) experts in Paris. ADAD specialists were initially trained in France and in our country; afterwards arborists and specialists were trained in the regions of Diber and Korçe and demonstrations were made in 10 plots of fruit trees. This technique has been implemented in France, we have studied it in CIREA (Centre Inter Regional of Agricultural Research), located in Agen France. We have received trainings with the support of FERT in 2004, 2005, 2009 and 2011 in CIREA center also.

The main problem we faced was the lack of knowledge on this technique in Albania. This technique was not known by farmers or by specialists who objected it, by using arguments of old technology. The green pruning in vegetation was completely unacceptable, as it was not used in arborists for a period of 50 years while it was difficult for them to accept the application of green pruning technique on their arborists.

The application of the new green pruning technique has brought tangible results to the development of arborists influencing the formation of the crown of trees, reducing the winter pruning and the pruning cost, and has improved the quality and size of the fruit, which has led to the increase of production and price by 10-15 ALL/kg (ALbanian Lek/kg).



The green pruning technique directly affects productivity growth, fruit production and lowering of production costs. It ensures also a sustainable level of annual production. After the application of Green Pruning technique, we have continuously observed the fruit growth, power of tree growth, production, winter pruning, creation of fruit, production cost and output.

The results achieved in the demonstrations pilots have attracted not only the interest of farmers where the application has been made, but also of other farmers and specialists. Application of the new Green Pruning technique has been supported and replicated by farmers in the regions of Korçe and Kukës.

Green pruning is a method that can be widely applied in Albania for all fruit tree species and can potentially result in increased production and quality, and therefore in economic gains too. The method has first been implemented in Diber region, and now is spread in other regions such as Korçe, Kukës, Elbasan, Fier.

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WHAT PROBLEM DOES IT SOLVE

The method addresses a number of problems arising after traditional pruning as the excessive vegetative growth resulting in low production.

Trees in our country had marked vegetative growth, because they were subjected to only winter pruning (during January-February) which stimulates outbreaks and development of vegetative branches, especially in trees with dome-shaped crown, where narrow angled branches dominate and because of the polarity of the top bud, they result in big vegetative development.

The excessive vegetative growth limits the development of productive branches and affects the product quality negatively. The resulting fruits tend to be small in size and poorly colored, due to inadequate aeration and light exposure, both of which affect the tree development physiological processes.

Green pruning directly affects the growth-production balance of the tree. It eliminates and limits excessive growth because is conducted during vegetation and thus saves nutrients, which are thus fed into productive branches and fruit growth. In this way, the tree can fulfill its physiological needs better, balance production and product differentiation load for next year, a period that coincides with the June to July timeframe, according to species and varieties. Green pruning also allows for selection of branches for crown shaping, and affects the formation of productive branches and production timing. Therefore, the pruning period coincides with tree physiology requirements.



Qualitative and quantitative aspects of advantages arising from innovation can be described by considering that the Technical Charter of Green Pruning creates a balance to the tree in growth and production, removes redundant (greedy) branches (thinning), restricts new offshoots, cuts the twigs based on two new offshoots eliminating



buds transforming these two buds from vegetative buds into fruit buds, creates the tree crown, improves the quality of production, simplifies considerably winter pruning, and provides a normal and annual production. The new Green Pruning technique influences directly the increase of production, fruit growth and reduction of production costs.

Green pruning solves the problem of vegetative mass reducing, balances and production-growth relation, directly affects the increase of productivity and quality of fruit. In addition, it reduces labor related to winter and summer pruning, therefore lowering production costs.

THE GREEN PRUNING IN PRACTICE

We were based on French arborists' experience and achievements. We prepared a technical fiche, which describes pruning techniques i.e. time of pruning, kind and type of branches that will be removed. Branches to be removed are the sprouts that get on the branches of the crown and have vertical direction, the ones that form a narrow angle with the trunk of the tree. These branches should be removed because they are vegetative; they are called "greedy" as they are not productive, they only absorb nutrient elements, affecting the tree health, and production of the following year. We mentioned also the advantages and effectiveness of the operation, its impact on the health of the growing tree, on its product, on the facilitation of services and reduction of costs.

Training

Information provided to the experts and farmers on the new technique of green pruning and theoretical and practical training provided to specialists and arborists. During the first half of June, the farmers received training on Green Pruning techniques and their importance.

Conduction of Green Pruning operation

Green Pruning is usually conducted from June 15 to July 15, a period that coincides with the growth and hardening of twigs. All redundant twigs should be removed. It depends on development and power of tree growth. It should be noted that twigs are cut on the base; two buds shall be left. This is to stop other offshoots and allow these two buds to be transformed into fruit buds.



The green pruning is usually made after 15-20 June until mid July or when the limb has 12-14 leaves. We started applying the green pruning method following a study tour including horticulture producers and experts in Ages (France) in 2004, organized by FERT. The resulting shape of the crown was axes with bended branches, which we considered advantageous, since it reduces the vegetative mass and eliminates development. Based on that, we decided to apply this method in Albania, because due to applied winter pruning method, the trees showed quite a substantial vegetative growth resulting in low production and poor quality, due to reduced aeration, low exposure to light, and high consummation of nutrient matter.

We have applied a modification to the method resulting in dome-shaped crown. It was also applied to other fruit trees, such as pears, prunes, etc. The green pruning method concerns the pruning time, types of branches and the way they are trimmed, and the measurement method, (to assess the pruning method effectiveness) including the weight and dimensions of the fruits, number of removed branches and number of fruit branches. Measurements were taken in a sample of 5 trees, for three years, during 2004-2007. We studied apple, pear and prune trees, but for the purpose of this presentation with present below data concerning apple only.

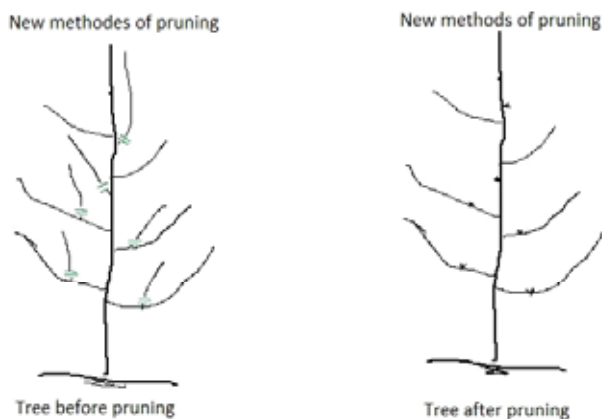


Fig. 1 Green Pruning method

Two of them are branches grown out of the trunk, while 4 grown out of the main (skeletal) branches. So, the pruned tree had removed 6 branches that were either at narrow angles or grown vertically. Each branch cutting is done with two buds.

The reduction of vegetative branches and number of resulting productive branches is shown in Figure 1, in order to make the differentiation between the old and green pruning method. Here we can observe two tendencies that have the same pattern of reduction of vegetative branches and reduction of vegetative mass, which means that more nutrients are available for the physiological and production processes of the tree. During the green pruning are eliminated many branches, reaching a vegetative mass reduction by about 41% thus saving about 30% in total nutrients. In this way, we optimize production-growth relation and differentiation of production buds for next year.

We can clearly see the formation of productive branches in Figure 1. We have two skeletal branches of the same diameter (\varnothing 20 mm) and height (2 m) from the ground for each tree.

This method has been very effective for the increase of production and quality improvement. For the first time it has been applied in Dibra region. In order to spread it across all regions in the country, we adopted the method with a modification consisting in choosing a dome-shaped crown and applying it for all fruit trees.

Differences with traditional methods

The green pruning method was not known in our country until 2004. Rather, only the winter pruning was applied, as described above. This practice gave rise to excessive vegetative growth, resulting in low productivity.

The new method implies that along with winter pruning, another round of pruning (green pruning) is performed during summer. Green pruning removes all vegetative branches with narrow angle and vertical direction derived either from the main trunk or from the main branches located on it. The branches are cut at the base, allowing two buds and no topping is applied whatsoever. The branch is either completely removed, or left as it is. After summer pruning is carried out another pruning in the following winter, to remove broken branches and do summer pruning corrections but never apply topping – basically following the same rules of summer pruning. Therefore, winter pruning is much reduced.

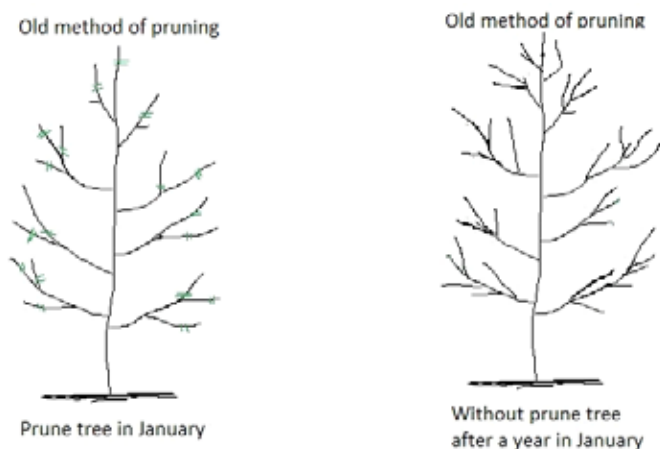


Fig. 2: The traditional method

The old method was based in one pruning only, performed in winter, during the period January-February, and that is based on cutting tops of all vegetative branches at $1/3$ or $1/2$ of the length of the vegetative branch, and removal of competitive branches, indiscriminately, without considering the angle. The new method involves performing two pruning sessions, the first to be performed in June-July and the second in winter, during January-February, but highly reduced. The two types of pruning are based on the principle of removing the branches at narrow angle and vertical direction and not topping the extremities of the branches. Schematically, results are shown in Figure 2.

Figure 2 shows the tree before and after the pruning occurring between January and February, (right) and after that – one year later (left) (i.e. January of the following year). It can be observed that the tree has a big vegetative growth, which needs to be trimmed. The result is that this pruning method does not lead to productivity.

RESULTS

Agronomic results

With the application of the green pruning method we see a higher development of productive branches, resulting in increased productivity. The difference in resulting productivity is between 12-20%. The application of the green pruning method, supported by data, results in growth of fruit dimensions, reaching up to a diameter of > 70 mm, which meets the market standard. In addition, the average fruit weight results 50g higher compared to the old method, and tree productivity increased by 5-8 kg, which expressed in productivity, results in a growth of 70-120 kg/ha. With this methodology was achieved a fruit growth by 50 g. and reached the required standard, the production of apple was increased by 5-8 kg for apple tree, or the product was increased to 75-120 kg/ha.

Economic results

The cost reduction after the application of Green Pruning method was from 19-21 ALL/kg to 15-16 ALL/kg, or 20-25%.

Other impacts of the green pruning include a normal growth of the tree and normal bio-physiological activity of the same. It is estimated that this method results in a 12-14% increase of fruit quality, which is converted into an economic gain of 5-15 ALL/kg in terms of increased price.

The introduction of the new Green Pruning technique has had great influence in the local level, initially in Diber. The arborists of other regions have witnessed the outcome of the arborists of Dibra following the demonstrations and trainings organized in Diber and have applied this experience in the regions of Korçe and Kukës, where the Arboriculture is more developed. This technique will potentially be applied at national level, because of the results achieved from its application.

INTERNATIONAL INTEREST

In France innovation is experimented in research centers and applied in agricultural farms; afterwards it is approved by the respective institutions and then replicated. We transferred this technique to Albania in 2004 and this has been applied in the following years with the support of ADAD/FERT, represented by the French expert Mr. Patrick Hainemann and Mr. Hafuz DOMI expert of ADAD in Albania. The international organizations for cooperation that support the transfer of innovation in other countries are FERT in Paris (www.fert.fr) and ADAD in Albania (www.adadmalore.al).

Other contacts with foreign realities that improved international interests on this innovation were on the occasion of the following symposiums:

- International Conference "Albshkenca" Tirana, Albania, 1- 5 September 2010
- International Symposium, Tirana, Albania, 19 October 2010. European Day of Agri-Biodiversity
- First International Conference of Agriculture, Food and Environment (ICAFFE) 27-28 May 2011, Korça Albania.
- International Conference "Albshkenca" Pristina, Kosovo, 1- 4 September 2011
- Biotechnical Faculty University of Ljubljana-International Symposium and XVII scientific Conference of Agronomists of Republika Srpska, 19-22 March 2012
- 7th International Symposium on Irrigation of Horticultural Crops, 16th to 20th July 2012, Geisenheim, Germany

TO KNOW MORE

In order to better understand the innovation, authors suggest analyzing the follow proceedings presented at the above mentioned congresses:

- Domi H., Kullaj E., Spahiu T., Thomaj F. "Hydraulic conductivity of different rootstock/scion combinations of apple under a hot, semi-arid Mediterranean climate", International Symposium and XVII scientific Conference of Agronomists of Republika Srpska, 19-22 March 2012.
- Domi H., Spahiu T., Kullaj E., Thomaj F., "Influence of M9 rootstock on the reproductive behavior of apple cultivars under dry, semi-arid growing conditions", International Symposium and XVII scientific Conference of Agronomists of Republika Srpska, 19-22 March 2012
- Spahiu T., Domi H., Kullaj E., Thomaj F., "Behaviour of four apple cultivars on four clonal rootstocks under the growing conditions of Dibra region", International Symposium and XVII scientific Conference of Agronomists of Republika Srpska, 19-22 March 2012.
- H. Domi, E. Kullaj, T. Spahiu and F. Thomaj June 2012, Xylem dynamics of different rootstock/scion combinations of apple under a hot, semi-arid Mediterranean climate, 7th International Symposium on Irrigation of Horticultural Crops, 16th to 20th July 2012, Geisenheim, Germany.
- E. Kullaj, H. Domi, T. Spahiu and F. Thomaj juin 2012; Behaviour of apple cultivars under a high radiation and temperature regime of Western Plains in Albania, 7th International Symposium on Irrigation of Horticultural Crops, 16th to 20th July 2012, Geisenheim, Germany.
- Domi H., Kullaj E., Spahiu T., Thomaj F. , Ferraj B.: "EM9 rockstock's impact on some indexes of the growth of the Golden Delicious, Ozar Gold, Grany Smith, Red Chief and Starking apple cultivars", International Conference "Albshkenca" Pristina, Kosovo, 1- 4 September 2011.

- Domi H., Kullaj E., Spahiu T., Thomaj F., Ferraj B.: "Impact of EM9 on crown architecture of some apple cultivars", International Conference "Albshkenca" Pristina, Kosovo, 1- 4 September 2011.
- Spahiu T., Domi H., Ferraj B., Kullaj E.: "Behaviour of some apple cultivars grafted over M9, in two different climatic zones of Lushnja and Korca", First International Conference of Agriculture, Food and Environment (ICAFE) 27-28 May 2011, Korca Albania.
- Domi H., Spahiu T., Thomaj F., Ferraj B.: "Impact of sub-grafting EM9 on some growth parameters for apple cultivars: Golden Delicious, Grany Smith, Red Chief dhe Starking", International Symposium , Tirane, Albania, 19 October 2010. European Day of Agri-Biodiversity.
- Domi H., Spahiu T., Thomaj F., "Morfo-biological study of some vegetative rootstock of apple in the conditions of our country", International Conference "Albshkenca" Tirane, Albania, 1- 5 September 2010.
- Domi H., Spahiu T., Thomaj F.: "The behavior of some apple cultivars on vegetative rootstocks "Pajama - 2" "Supporter 4 Pi 80" and "MM-106 ", International Conference "Albshkenca" Tirane, Albania, 1- 5 September 2010.
- Domi H., 2007: Intensive cultivation of apple with Vertical axis form
- Domi H., 2008: Apple cultivation - Axis shaped
- Domi H., 2012: New apple varieties in our country

CONTACTS

The ADAD is available to provide technical support and innovation transfer to the interested countries. In order to establish collaborations, contact:

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