

RESEARCH ARTICLE

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The possibilities of walnut cultivation in Drin's Valley AlbaniaNAZMI AJAZI¹, VATH TABAKU², KRISTO QENDRO³¹Ministry of Agriculture, Rural Development and Management of Water²Faculty of Forestry Sciences AUT³Dajti Express sh.p.k

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Abstract

A powerful plant with special, botanical characteristics and a longevity over 300 years, specific in Drini i Zi's valley. The treatment of rooting system that is related to terrene's factors in the pond of Drin river. Chemical treatment of "Juglandine" and the damage that it causes in other types of plants such as: apple tree, etc. The study of "mikoriza" rooting system and earth conditions of its spread. The influence of climatic changes and the precautions that are taken to adapt these plants; climatic profile of Drin's valley, the tendence of changes and expectations. It is treated the problem of heterogamy, the role of late frost in this region, the graphic of temperatures' spread in last ten years. The role of crusified pollination in nuts' breeding, as we have to do with a valley zone. It is treated the cultivation's biotechnology; difficult reasons of breeding in natural way, because of phenol. This is the main reason that we want to develop the technology of artificial sapling. Growth through vegetative breeding, the use of new grafting technology. We treat a new way of graft, the time of isolation, the way of treatment after grafting until the laying. The species that are used in graft, the specification of some special qualities that make irreplaceable the organic connection between them. Phytosanitary protection in adaption with climate that species require. The graphic of spread and recomandation of new zones that will be analyzed by us. Chemical analysis and alluvial lands. The process "katena" which is treated in adaption with configuration of rocks in Drin's valley. Tabular data about mature lands, that are recomanded to be cultivated with nut trees in this region.

Keywords: biotechnology, treatment, breeding, adaption, phytosanitary.

1. Introduction

Special treatment of *Juglans Regia Nutin* Drin's watershed represents a great economic importance, because it is an orchard of the most important forestry in this area.

It is a very strong plant with long life that goes from 200 to 300 years, monoike plants, deciduous.

It is a majestic tree that goes from 25 to 30m in height and diameter stump exceeding 1-1,5m, has a regular, cylindrical shape. Peel is smooth and shiny for a long time, gray in silver, later it gets longitudinal, regular, deep cracks. Its cultivation is an early process in our country and many villages has the name of this walnut tree.[14]

Rooting system is pivotal in the beginning and later it takes lateral development. It has a very strong and dynamic rooting system which stops at the age of 30-35 years, the secondary roots begin to appear strongly after 5 years. It is estimated that the extent of the rooting system occupies 300 m² area. We note that the roots of nut do not createmikoriza as many other trees. Depth of roots goes up to 3.5 m. The installation

in this way makes the trunk bear large water flow and therefore development on the banks of rivers stimulates anti-erosion measures to protect the land.

The rooting system of nut faces putrefaction (*Phthophthora* spp.), especially in soil with high moisture content and warm weather. This is a fungus which attacks the rooting system and weakens the plant by causing its drying. In such cases the plants should be pulled up and moved.

The climate requirements are provided in a geographic longitude with a broad reach to 49°. Meanwhile our country has very favorable position between 39° and 43°. The optimal zones reach temperatures of 8°C - 10°C, when winter is mild and summer is hot. Temperature is an important meteorological element and has impact on the plant throughout the year. She endures cold -25 -20°C, without getting harmed. The reduction of temperatures in early autumn causes serious damages especially in November, because it hurts cuttings. To get a nice nuts' fruit production, climate is a determining factor. We note that position plays a big role in local temperatures that are created, therefore it

is needed a consult with specialists in case of artificial sowing. These make it possible to compute the definition of air currents, frost pockets, the sloping, etc. Temperatures higher than 10°C shall be in an amount up to 2500°C, days with solar lighting, no less than 1000 hours for the period from May to September. Temperatures above 35°C associated with drought cause the burning of cuttings and fruits, but in this case are very rare. We note that such a situation can touch only the perimeter around the Kukesi city and the rest of the Drin's Valley fails at such levels. We note that resistance to temperatures depends on the heritage, agro-technic services and age and phytosanitary situation. Atmospheric rainfalls should be above 700 mm. This region is optimal to accomplish this condition. The optimal air humidity between 60-70% is favorable for this case. Height above sea level for maximum production ranges from 350 to 500 m and this Valley is appropriate, because it extends in Klenjë, Dibra.[2] We note that above this level the quality of fruit begins to fall. Nut is sensitive to soil moisture; underground waters should not pass under 5-6 m; needs schist soils, stony and ventilated ones, along streams and valleys. The most appropriate ones are SAM alluvial soils and sandy- clay with pH 5-8.5. It requires soil rich in Ca and P. This plant need light, in young age can accept a little shade, but when the crown grows it needs sunlight all the time. It a huge plant, with 5-9 elliptical or oval leaves, 6-12 cm long, 5-8 cm wide, full, without fluff and aromatic. From these leaves are produced pharmaceuticals products from which are popular "tatine" oil. The walnut tree is developed, but short, with considerable diameter, has an industrial value in market and it is very demanding throughout the globe, having a quantity of 60 to 80 trees / ha, the average annual growth ranges 1-1.2 m³ / ha / year, but adding elements of the crown, the growth passes other forest trees too. It is estimated as expensive wood, because its veneer and has a great design with longitudinal fibers and light streaks, with medium specific weight required in the industrial market of furniture's, equipment's, in wood carving ect.

2. Material and methods.

In global agro-forestry, up to 80 years of the last century, planting scheme results 10mx10 m or 100 root / ha, later is applied a scheme in some variants aimed maximum utilization and productivity growth. But the management of the blocks however it was,

would not have changed anything in number. As a result was introduced planting technology side fruit production which has yielded results. Planting schemes go 7 x 3 to 6 x 4 m corresponding to a number of plants 400 to 500 trees / ha. This refers to the large areas of plains, and this case has never been implemented. But everything is possible and recommended if you apply the main techniques. The plant should be planted again the same depth as it was in the nursery, bedding requires root system development, that's why we give it the right importance. The analysis shows that the practical field of nuts requires aerated soils, deep, non-acidic, fresh, but not wet, illuminated places, in places where rainfall is sufficient. The presence of black elder and nettles is favorable indicator for planting walnut.

- *Production of seedlings and cultivation technology.*
- *Traditional grafting (winter grafting in greenhouses).*

There are used almost all the technologies and machines that are used in grafting of vine. The deadline of getting saplings from December until the first half of February, and enabling it in March too. Rootstocks are the annual seedlings while over-grafts are slips taken from scions annual scions which must be well matured. Rootstocks in the neck of the root should be 1-1.2 cm in diameter which should be taken from the nursery 15 days before grafting. We clean it, cut roots axle, hold a few days in 28°C temperature and air humidity up to 85% to activate the cells of apical meristem and kambium. The scions for over-grafts are selected healthy and matured-(annual), with a length of 25 cm and a diameter of 8 mm, taken 3-4 days before grafting. Priority is given to the bolt grafting where the rootstocks and over-grafts must correspond.[6]

Grafting technique consists in tangential cutting made in rootstocks and over-grafts and procedures continue with qualified specialists. Once the actions are carried out in order it is realized the treatment after grafting where seedlings are placed in crates that open sideways. At the end of the crate is placed a layer of wet sawdust 4-6 cm, placed a layer of saplings covered with 2-3 cm sawdust, and so on until the filling. The crates are placed at 26-30 °C temperature and air humidity 90-95 %. In these conditions "kallusimi" occurs in 12-15 days. [12]

- *Grafting with stitch in nursery (ring grafting)*

This type consists of two components rootstocks and over-grafts realized with loops cutting at 2.5cm in length. The removed ring of rootstock is replaced with the ring of over-graft. This is made by qualified specialists.

- *Grafting with rectangular pieces*

Method: From over-grafts we make a rectangular cutting of the bud with dimensions 2 cm length and 1.2 cm wide, in the same dimensions is performed an incision in the rootstock. Instead of that we put the part taken from the plant slips. The specialist should have prepared a relevant knife with four edges from 2 to 1.2 cm.

- *T-shaped Grafting*

For this type of grafting is used the same method used for fruit trees in the nursery. The base material is mainly grafting knives, slips and rootstocks.

- *Grafting with slips.*

It is completed before the vegetation; the graftman takes care of weather. Overcast sky, soft temperature, lack of wind, the presence of atmospheric humidity, so slips should be semi-open and graft height should be 1 to 1.5 m from land. The place of grafting should be fully illuminated, a condition for joining the two parts of the graft interception.

There are two ways, grafting with full cracks of rootstocks and subcutaneously grafting. The first case is opened 4-5 cm in the middle of the rootstock. The slip is 10 cm with two buds, almost equal diameter. The union of slip with rootstock, is achieved by cutting the quite polished slip, cuneiform for better compliance of cambium it. The connection is realized by wax and is placed in a plastic tube.

Deal slips in the winter and stored in fresh environments. When the tree which will be grafted, begins opening of buds, at the end of April and beginning of May, will be selected the branches to be grafted to 2-3 m height. Grafts get better in heights. It usually liquefies as in winter and at the time of opening of the buds. Liquefaction is the main reason of grafting failure. To avoid liquefaction, first cutting is done about 5 cm above the grafting cutting position about a week or ten days before grafting. Cutting down the top decreases the development of branch and liquefaction stops. Once you are insured that there

is no liquefaction we do the cutting 5 cm below and the grafting is realized.

It is known that nuts are difficult to be propagated, so there are some reasons related to some specific phenols that inhibit the formation of callus. For this technology in artificial conditions has overcome this problem. Above are treated practical methods that are used in the region. We note that in artificial conditions of heat 25°C and air humidity of 75 %, this problem is resolved. But in our place the walnut grafting is not applied and the production of seedlings is only by seed. Technological turn of seed's cleaning; sowing in hotbeds etc. is well-known. For two or three months seeds should be treated to stimulate planting in spring. Another case is the open field planting often applied to us in nursery lines, but there is a risk of deviation due to ecotype (parent).

The European way of grafting is with stamp (patch - budding) which requires specific conditions and it has provided sufficient results in the U.S., while in Europe this has no results.

Th propagation throughout English grafting in the months from February to March where grafts is *Juglans Regia* and over-graft is the cultivar that we want to cultivate. The technique is similar to the ones mentioned above. In order to enable an early propagation, it is recommended the root stocking with "Juglans hindisi" and the plants grafted in this way are distinguished by strong growth and root system are developed. They are resistant to diseases such as Verticillium, Armillariamele, nematodes Meloydogine port is sensitive to victory. It can represent other anomalies, but it is an acceptable type in soil with high calcium content.

Juglans Regia x *Juglans hindisi*. Hybrid rootstocks accelerate production acientness. Plants are resistant to nematodes and the Armilariamele or Blackline. During the field verification conclude that in some regions is applied at planting new blocks with modern concepts of intensive and specialized fruit-growing So, choosing the cultivar, increasing planting density and mechanized cultural services. It is spreading rapidly especially in recent years with funding made by the Albanian government. Another role has played the abundant information that makes it possible to avoid the traditional practice by introducing new cultivars. So it is recommended the choice of genetic material (Hartley, Franquette, Parissiene, Serra, Sorrento), meanwhile the practice in Northern Italy that has started to produce genotype originating from California such as Chandler, Howard, Pedro with French Franquette pollinating.

These cultivars are characterized by qualitative features and taste of the fruit is the same with traditional ones.

3. Results and discussion

During the three-year on-site verification of Valbona Valley to Ostren, according to collection points where are traded the nuts of this area we have reached some conclusions. We are dealing with traditional nut located on agricultural lands and meadows, along streams in Tropojë districts, Kukes, Has and Dibra Bulqizë. There are not included the new cultivars, because there are not entered into production yet, the origin is known etc. circumstances of planted genetic material. For their determination we are referred to morphology of variable type, borders additional taxonomic groups that accept diversity within a species [1].

First on the borders of *Juglans Regia*, L. potted two forms of *Juglans Regia* L var DCE cultivated and wild “*Juglans Regia* L. v. durahort DC” with strong shell.

Given the total inventory of walnut in the region and supported in samples of fruits as well as data that is given to growers (interviews), we have been considering some features which are collocated like this:

- The observation of pheno-phases from the beginning of flowering to grain connection (time of fruit ripening).

- Dendrometric measurements of diameter in chest height.

- The height of the trunk

- Diameter of crown

- Age (life expectancy)

- Average annual production according to interviews of residents.

- Location, popular name, cadastral if there is one, Municipality, height above sea level (data specific to agroforestry information)

- Information about the fruit

To extract the data as real as possible we are supported in some data of native scholars before 1990's because this data belong to collective economy period. All the results are questionable because the analysis of our observations sometimes are taken subjectively. Counties region specifically in Kukes and Dibra gives this classification type:

1. Nuts with large grain

2. Nuts with long grain

3. Nuts with thin sheathed

4. Nuts in clusters form

5. Nuts with hard sheathed

6. Nuts to thrive later

Walnut with large grain (*Juglans Regia macrocarpavarDC*)[4] is widespread throughout the region, the market is demanding and cultivars are interested in cultivation. It has a large grain as its name, with cracking, fading cloves which don't reach their shell completely. It is found in Margegaj, Tropojë, Bicaj, Kolsh Cottage Kukes, in Okshtun, Selishta, Kacni, Zerqan, Arras, Kastriot, directly after the disk Maqellara anywhere in Dibra. Its growth presents economic interest, resistant to pests.

Walnut with long grain (*Juglans Regia* var. *ElongataDC*)[4]. It is rare and hard to cultivate, cloves separate with difficulty from their shell. This nut can be found in Trebisht, Gjuraj, Luznia, Pear etc.

Walnut with thin sheathed (*Juglans Regia* var. *teneraDC*)[10] is distinguished by the shell which is thin, maintains a high ratio of core with grain. It is demanding in market, especially prevalent in some municipalities of Debar as Lure, Arras, etc. The villa Kukes.

Walnut in the form of cluster (*Juglans Regia* var. *racemosa*)[10] is rarely found, usually there are 8-12 grains in form of clusters, small grains, but it has short torso with little wreath with high yields. Increases in hilly areas, very sensitive to late frost. It encounters Tuçep, Sofracan, Arrëmollë, walnut etc.[11]

Walnut with hard sheathed (*Juglans Regia* var. *dura DC*)[3] have no demand in the market for such reasons: has strong peel, core separation is difficult, small grain, but they are plants that have high demands on land, accept the drought and in tough environmental conditions, are likely to be used as rootstock. Wood is a very high texture and demanding in market.

Walnut to thrive later (*Juglans Regia* var. *serotina DC*)[10] comes as a result of late vegetation, as it grows in higher heights above sea level compared with other varieties. There are special specifications in relation to quality, trunk, phenology. Nuts like this are found in Radovesh – Dibra [5]

Association. Nuts for specifics presents itself, with a dense crown and relatively a large one, is not associated with other trees. But in plantations and flat places accepts plant association with bushes such as: elder, hazel, cornel, hawthorn of which poses no risk to light.

From analysis in the study in conjunction with traditional treatments requiring nuts

compared with the cultivated nut for Drin river basin according to data acquired in the field, it results:

Table 1: Comparison of traditional treatment with treatment as amended.

<i>Characteristics</i>	<i>The traditional treatment</i>	<i>The treatment in the cultivated blocks</i>
Trees per hectare	100-150	200-250
Price for planting	Cheap	Expensive
Economic lifespan	40-50 years	30 years
Mechanism's level	Low	Medium
Watering	Not applied the watering	Applied the watering
Protection from pests	Hard	The fitosanitar treatment against Xanthomonas juglans
The care from pruning	Few	Orientation to the fast production
Fertilization	Few	Periodic
The economic perspective	Limited	Optimal in relation with costs

In plantations, especially in the Dibra region, nut is applied to the planting in association with fruit trees such as plums and cherries (as Zdojani zone, Castrioti zone etc.).

In many cases it is used cultivated hazelnut shaped terrace. Vegetables are accepted as associations too, but better accepted is corn. This because of the purpose of rational use of agricultural land. Rye and wheat are not recommended as they are competitive against humidity.

4. Conclusions

But, seeing the importance of walnuts as agro forestry plant, it should be estimated for its trunk. Specifically:

- when the plant has reached maximum production and the crown has started drying, so overaging above 170 years, should begin to estimate the trunk and branches in the industry.
- when it is treated in the forest cluster and is required attenuation of crooked trees etc. which are required by forestry.
- when the phytosanitary damage exceeds the limit and is not economic its further treatment.
- When it has immediate damages, injuries, fractures large branches,

Only in these cases the walnut timber passes in industrial assessment.

Fruit is the product of pollination in the spring, it continues the connection of fruit with fruit and in late September and October it reaches the ripening and harvesting [8]. We are referring to Albanian walnut

that it's common called as typical. The size of the fruit ranges (5-18) gr, cloves weight (1.85-9.8), the radius of clove (32.6-63.8), it is smooth and tastes like gujada, full filling of clove, resistance against diseases, creating a material native of interest for local and foreign market.

Forms and populations, among them distinguished by a number of features and biological features or botanical features, from biotic and abiotic factors etc. These are the phenomenon's that enable the spread of some populations and the specific characteristics of each zone.

In the territory taken in the study we distinguish in particular Tropoja's nut, with thin integumentary of Gashi and Valbona, Dibra with nut of Maqellara and Kastrioti. [8]. These features have raised them in native cultivars regional levels and highly sought in the domestic market [11].

However, to increase the quality and production barriers humankind passes through experiments by performing genetic ecotypes and harmonizing different cultivars by rootstocks etc.

Key role in this process plays biotechnological process of combined use with world's cultivars and market supply with new cultivars that go into production quickly and maintain their quality. We will treat here some ways that are applied in this region and providing further recommendations.

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