

THE INFLUENCE OF SOIL WORK ON QUINCE PRODUCTION IN THE CONTEXT OF CLIMATE CHANGE

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Abstract

Setting up a quince orchard is a safe and highly profitable business from the start. The lifespan of quince trees is about 15-18 years, and the fruit can be quickly exploited because they can be eaten fresh, preserved in compotes and are the raw material for the production of schnapps and plum brandy. It is recommended to set up the orchard with grafted seedlings purchased from certified authorized nurseries that offer quality guarantees and practical advice for tree maintenance. Quince bears fruit in the 3rd year after planting, and in the 5th year it reaches maturity and can produce 30 tons per hectare. Particular attention should be paid to tillage, which can severely affect the quantity and quality of the crop.

The most productive variety recommended for setting up a quince orchard is the BERECZKI variety, characterized by vigorous, self-fertile trees with large and very large fruits.

Key words: chernozem, nursery, self-fertile, treatments,

INTRODUCTION

The quince (*Cydonia oblonga*) is part of the Rosaceae family, being a rustic tree, frequently found in family households. It is a tree of medium vigour, with a robust appearance originating from Southwest Asia, being cultivated since antiquity. The quince is an early fruit tree which bears fruit 2-3 years after being planted and has a high production capacity. It is a demanding species for light and heat. If the plantations are located on shady land, the branches become bare, and the productive potential decreases. The root system is shallow and the crown is thick. The bark of trees is very sensitive, being affected even by superficial blows. The fruits are rich in gelling substances. For this reason, they are sought after for jam or marmalade. Quinces also contain sugars, proteins, pectin, calcium, magnesium, potassium, and iron.

MATERIAL AND METHOD

In the spring of 2014, the Berezki quince variety was planted in the farm belonging to PFA Gîtea Daniela, on an area of 0.50 ha, four meters between rows and three meters between trees per row (833 trees per ha).

150 kg N, 100 kg P₂O₅, and 100 kg K₂O were administered annually. During the vegetation period, the plantation was visited weekly so as to closely observe the evolution of the health of the trees.

Vegetation cover treatments were carried out against pests, according to the biology of each pest, the existing damage threshold, with one of the following substances: Decis Mega EW 50, Calypso 480 SC, Karate Zeon 50 CS, Faster 10 CE, Novadim Progress, Nurelle D. 1.5% Confidor Oil was sprayed during the vegetative rest.

Treatments with copper-based substances were the most used for diseases because they fight most of the existing diseases in quince.

During the vegetative rest, copper sulphate sprays were used in concentrations of 4%, 2%, 1% to better control the fungi and bacteria existing on the bark of the trees, by bathing the trees.

Funguran OH 50 WP at a concentration of 0.3% was used as a treatment in the pre-flowering stage while, during the flowering one, a spray with Aliette WG 80 was applied at a concentration of 0.3%.

During the vegetation stage, warning and cover spraying was carried out with one of the following fungicides or, if the weather conditions required, even mixtures of contact fungicide + systemic fungicide: Dithane M 45, Champ 77 WG, Systhane Plus 24 E, Score 250 EC, Topsin, Captan 80 WDG, Thiovit Jet 80 WG, Kumulus DF.

The soil maintenance in the quince plantation was carried out by preserving it as a dead-fallow.

The dead-fallow is especially indicated in the first years after planting and consists of superficially loosening the soil 5-6 times during the growing season, with the help of a disc harrow or a cutter. The execution of the soil mobilization works can be interrupted, leaving natural grassing to facilitate the circulation of the tractors on the plantations located in areas with a lot of precipitation during the fruit harvest. One or two manual ploughs do the maintenance of the soil on the row of trees in the first years after planting, after which in the following years the superficial loosening is carried out with rotary hoe with sensing device in the first part of the year, followed by the administration of herbicides in the second part of the year. Of these, Roundup 3-4 l / ha, Glyphothim 4l / ha gave satisfactory results.

A 20 cm deep ploughing was carried out in autumn, which tried to incorporate all the existing plant residues as well as the leaves fallen from the trees in order to reduce the possible outbreaks of diseases.

RESULTS AND DISCUSSION

The autumn tillage and another 1-3 light interventions to break the ridge during the summer, plus spraying herbicides in the spring are great solutions for orchards located in areas with lower rainfall. The maintenance of the soil with mulch brought from outside the orchard is even more appropriate, as it maintains a lower temperature in the soil during the summer, allowing a regular activity of the roots.

The soil works depend on the maintenance system adapted in the respective orchard and aim at creating a loose, structural soil rich enough in fertilizers, with enough humidity and able to maintain an intensive bacterial life.

The main link in the chain of works that is applied to the soil in the quince orchards is the autumn ploughing. It aims to loosen the soil to a maximum depth allowed, making it easier for water and air to penetrate, to better apply fertilizers and, at the same time, to help the roots to penetrate and stay as deep as possible.

The best time to plough in autumn is 20-25 days before the leaves fall or 10-12 days before their turning yellow on the harvested trees. It is necessary to do it at the mentioned times as the active growth of the roots takes place in autumn, which helps to heal the wounds, and benefits to the maximum from the improved conditions created by ploughing. Leaving the land unploughed and often heavily trampled after the harvest means significantly reducing the active growth rate of autumn roots. The less rocky the autumn plough, the better it is for soil microorganisms and tree roots. Therefore, ploughland is harrowed immediately or after rain.

6-8 works are necessary in the rainy regions to destroy the weeds with the detachable disc during the summer, while in the dry ones 3 are 4 are enough. When weed destruction and loosening work are not done in time and weeds have grown too large to be destroyed by light mobilizations, the soil is ploughed at 10-12 cm depths and dug immediately. Particular attention will be paid to tillage in intensive orchards, located on slopes and terraces, which must contribute to prevent erosion. For this purpose, tillage is mandatory in the direction of contours. At the same time, it must be ensured that on the un-terraced lands and continuous terraces, with a sloping platform, the

working tools, and especially the plough, do not continuously and significantly transport the soil from upstream to downstream.

The condition of the soil at the time of the work is important for both the autumn works and the light work of loosening and destroying the weeds during the year. Working a too dry or too wet soil leads to the rapid loss of physical properties. For the effective control of weeds in the quince plantations and to limit the number of superficial works, which damage the structure, it is recommended to apply herbicides, supplemented with loose soil. Commercial herbicide products used in fruit growing are divided into two types: - preventive herbicides (which act on the root system of weeds at the time of seed germination. They should not be used in large quantities, as they may damage the roots to some extent, especially in young plantations); - curative herbicides (which destroy weeds through the aerial part) and which are of two types: herbicides that burn the leaves and stems of the weeds by contact; they give very good results only in dry (droughty) springs; if it rains after treatment, their effect decreases greatly; systemic herbicides - these are applied to the leaves and stems of weeds, after which they enter their body and are transported by sap to the roots, which they destroy.

These systemic herbicides are the only ones that destroy perennials: wheatgrass, creeping thistle, field horsetail, wild stevia, etc. However, one must take into consideration the fact that these substances should not fall on the organs of the tree (stem, leaves, fruit) because they cause burns and are toxic. Therefore, they must be applied in nice weather without wind, the pressure in the sprayer must be low, and the jet must be directed towards the ground. Very good results are obtained by applying herbicides if a preventive herbicide is combined with a curative one in a single treatment. The treatment can be done later in the spring when some weeds have sprouted. In this way, weeds are destroyed and the seeds in the soil are prevented from germinating.

Thus, in the agricultural year 2021, when we were dealing with a prolonged atmospheric and pedological drought, when the rainfall amounted to a total of 47 mm during 5 calendar months falling in 4 stages, and the temperatures between June and September were mostly above 33°C, and in some periods the temperatures were for periods of 5-7 days in the range 38-42° C, the lack of water was felt strongly leading to taking agrotechnical measures to maintain water in soil.

During the summer months with water deficit, the land mobilization works were reduced by repeated disking and milling between the rows of trees, from 6-8 works in average years to 3 millings. In the direction of the

rows of trees, only one milling was carried out using a rotary hoe with sensing device at the beginning of the period deficient in precipitation, after which mulching was carried out in the direction of the rows of trees with geotextile foil for mulching covered with a mixture of sawdust and chopped straw.

This mulch was made in the direction of the rows, covering them with 1.10 m wide geotextile foil on either side of the row of trees, then covered it with a 20 cm layer of a mixture of sawdust and chopped straw, materials that can be incorporated in the ground in autumn. Sawdust was chosen for its longer water retention capacity.

After placing this mulch, the mixture was moistened by watering it once a week, with the spray pump with the nozzles modified for this wetting. 2000 litres of water were applied in the direction of the row from one end to the other in the early morning hours, no later than 8 am.

CONCLUSIONS

The observations made during the whole vegetation period show the following data:

- the annual growths of the trees, whose rows were mulched, were (on average) 16 cm longer than the growths of the trees on the uncultivated control row

- the soil on the unmulched control row showed obvious cracks, even 4-5 cm wide, with detrimental influences on the roots, especially in terms of water supply to the trees

- the growth force of the tree trunk showed an increase of 3.6 cm (on average) in the number of trees on the mulched rows compared to the non-mulched control row

- the production registered differences between the control row and the mulched rows by up to 28.8%, from the collected data resulting the fact that we have a production of 15.6 tons/ ha at the control row, and 20.1 tons / ha at the mulched rows

- in terms of fruit quality, it was observed a decrease in fruit quality by the fact that the fruits from the production of the control row were smaller in size and weight, also showing sclereids compared to the fruits from the production of mulched rows. The ratio between the first and second quality fruit was 1/1 in the case of unpeeled rows, compared to 2/1 in favour of first quality fruit in the case of mulched rows.

For fruit species grown without the possibility of installing an irrigation system, the method of mulching the rows of trees is an acceptable

solution in terms of the costs involved, which can lead to saving the crop in years with a rain deficit.

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