Scientific Papers. Series B, Horticulture. Vol. LXIX, No. 2, 2025
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

RESEARCH ON THE INFLUENCE OF THE SOIL MAINTENANCE SYSTEM ON THE QUALITY OF CURRANT FRUITS

Maria Marinela DRAGNEA[1], Cătălin-Viorel OLTENACU[2], Mihai GÎDEA[1]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, Bucharest, Romania
[2]Research and Development Station for Fruit Growing Băneasa, 4 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania

Corresponding author email: maria.banca95@yahoo.com

Abstract

The research carried out follows the influence of the soil maintenance system on the quality of fruits from currant plantations in the climate and soil conditions of the northwestern Romanian Plain. Weed control in orchards by manual weeding and the use of mechanical means requires a lot of labor and the allocation of significant resources. A wide range of pre-emergent and post-emergent herbicides are used for chemical weed control, which are very effective in orchards of fruit trees. The problem of the use of herbicides in fruit growing must be considered not only from the perspective of the immediate effect on the plantation (total or partial elimination of weeds), but also from the point of view of the quality of the fruits, determining the specific biochemical parameters.

Key words*: maintenance system, plantation of fruit trees, fruit quality.*

INTRODUCTION

The exploitation of fruit ecosystems must be done with maximum efficiency, without aggressions and ecological vulnerabilities harmful to humans, animals and the environment. On the horizon of the 2050s, the expansion of the use of herbicides is expected primarily due to the acute lack of labor and the need to increase economic efficiency. That is why the problem of using herbicides in fruit growing must be seen not only from the perspective of the immediate or subsequent effect on the orchard, on the fruits, but also from the point of view of the quality of the environment in the entire fruit growing ecosystem. All categories of herbicides are phytotoxic for trees and can cause herbicide residues in fruits when the application instructions are not strictly followed, especially the dose and concentration of the herbicide solution, the time of application, the equipment (nozzles) used, the type of soil on which the plantation is located, the spectrum of weeds to be combated and the types of herbicides used, the climatic conditions and many other factors.
In Figure 1 we present the factors that influence the quality of the fruits and the critical points of risk of the pollution of the trees, the fruits, the environment in the orchard, namely: the pedoclimatic factors: the relief, the soil, the light, the temperature, the humidity; physiological factors: leaf surface, photosynthesis, transpiration, respiration; biological culture factors: variety and rootstock; technological: density, management form, cutting, rationing, fertilization, irrigation, weed control, phytosanitary protection; harvesting and storage factors: time of harvesting, method of harvesting, handling and storage conditions.

Figure 1. The factors that influence the quality of fruits (edited by M. Berca)

MATERIALS AND METHODS

Regarding the soil maintenance system, the variants that were studied in the experiment were: the black field and the grass strips.

The black field

It consists in keeping the soil loose and free of weeds through a permanent mobilization of it through works performed with mechanical or manual means. Analyzed over short periods of time, the black field increases the degree of loosening of the soil and improves the aeration regime on the worked area and the speed of water penetration. Also, by destroying weeds, it conserves water better than strip irrigation (Sumedrea et al., 2002). Tillage causes an increase in biological activity, probably through the release of polysaccharide-type substances fixed between the glomerular aggregates, inaccessible to the activity of microorganisms, but also following the improvement, at least in the short term, of some physical conditions of the soil, especially aeration and water.

Grass strips

By fertilizing, the structure of the soil improves due to the channels that remain in the soil after the death of the grass roots, as well as due to the change in the size of the pores as a result of the pressure exerted by the roots on the soil particles and microaggregates. Also, the grass extracting water from the soil causes a contraction and respectively a cracking of the soil which contributes to increasing its degree of loosening. Rain causes an increase in the number of earthworms in the soil and favors their activity, contributing in this way to the increase in the soil loosening process.

Study area

The study was carried out at the Moara Domnească Experimental Base of the Research and Development Station for Fruit Growing, Băneasa, located N-E of Bucharest in Afumați, Ilfov County, part of Vlasiei Plain, a subunit of the Roman Plain (44°50' Northern latitude and 26°24' Eastern longitude and 70 m above the sea level), on five currant varieties: Jonkheer Van Tets (red currant), Rovada (red currant), Tisel (black currant), Abanos (black currant) and Detvan (red currant).

Jonkheer Van Tets (Figure 2) is perfect for smaller or larger gardens, being able to be planted both in the open field and in planters. It is extremely resistant to frost (-20 degrees). It is a very productive variety with medium-sized fruit, spherical in shape, red-glossy when ripe. The fruits are juicy, with a particularly good, sweet-sour taste, they grow in the form of long bunches.

Figure 2. Jonkheer Van Tets variety

Rovada (Figure 3) is a variety with long bunches. Forms a bush with vigorous growth. Loves sunny or semi-shaded places. The berries are large, spherical and red in long clusters. The pulp has a pleasant sour taste, which is maintained even after baking.

Figure 3. Rovada variety

Tisel is a variety with a fairly airy spherical bush with erect stems. It is one of the most productive varieties and quantities of over 15 tons of fruit/ha can be obtained.

Abanos (Figure 4) forms a vigorous bush with stems of medium thickness. The berries are large and intense black and shiny. The pulp has a

pleasant sour taste. The fruits are recommended to be consumed processed in juice, jam, jelly or wine.

Figure 4. Abanos variety

Detvan (Figure 5) is a new variety obtained in Slovakia recognized for its resistance to diseases and frost. The plant forms a vigorous bush, vertical position, with fast growth, height can exceed 1.5 m, slightly compact with thick branches and large leaves.

Figure 5. Detvan variety

RESULTS AND DISCUSSIONS

In order to elucidate how soil maintenance systems can influence the quality of fruit production, biochemical determinations were made regarding their influence on fruit carbohydrate content and acidity.

Also, the degree of fruit firmness was studied in the five currant varieties, depending on the soil maintenance technology in the plantation.

The highest carbohydrate content was recorded in the Tisel variety with 19.5% Brix, in the black field maintenance system, and the lowest concentration was recorded in the Rovada variety with 10.1% Brix in the grassy strip maintenance system.

Regarding the pH value, it varied in the range of 2.79-2.94 for the black field system and 2.78-2.90 for the grass strip system.

The lowest value in terms of citric acid concentration was recorded in the Rovada variety, both in the black field system and in the soil maintenance variant with grassy strips.

With regard to fruit firmness, it can be seen that the production obtained in the system with grassy strips shows slightly higher values in all varieties, except for the Rovada variety.

The highest value of firmness was recorded in the Abanos variety (0.52 kgf/cm^2), and the lowest in the Jonkheer Van Tets variety (0.15 kgf/cm^2).

The average results recorded in 2024 are presented in Tables 1 and 2, but also in Figures 6, 7 and 8.

Table 1. The influence of the maintenance system - black field on the main physical and biochemical characteristics of currant fruits, at harvest, 2024

Variety / Parameters	Tisel	Abanos	Detvan	Rovada	Jonkheer van Tets
Carbohydrates (% Brix)	19.5	17.1	11.0	10.3	11.8
pH	2.85	2.88	2.94	2.85	2.79
Citric acid (%)	2.48	1.65	2.41	1.00	1.72
Firmness (kgf/cm^2)	0.45	0.44	0.26	0.27	0.15

Table 2. The influence of the maintenance system - grassy strips on the main physical and biochemical characteristics of currant fruits, at harvest, 2024

Variety / Parameters	Tisel	Abanos	Detvan	Rovada	Jonkheer van Tets
Carbohydrates (% Brix)	18.7	17.2	10.4	10.1	10.7
pH	2.78	2.85	2.90	2.78	2.81
Citric acid (%)	2.62	1.78	2.47	1.27	1.78
Firmness (kgf/cm^2)	0.49	0.52	0.31	0.26	0.18

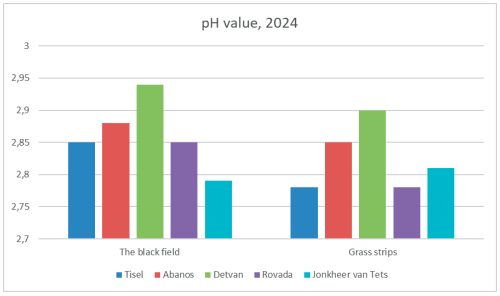

Figure 6. Comparative pH values recorded by currant varieties in 2024

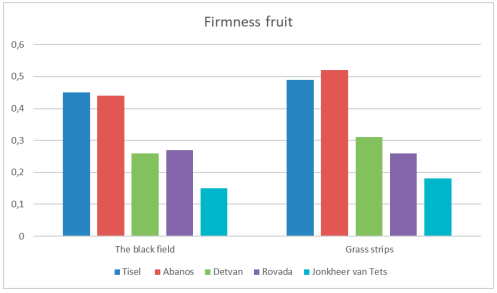

Figure 7. Comparative firmness values recorded by currant varieties in 2024

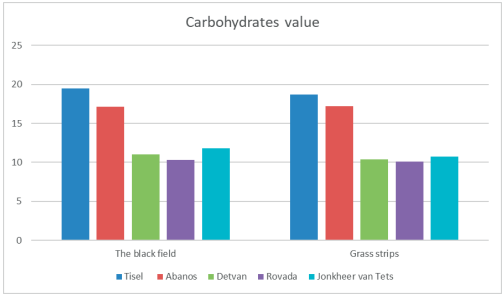

Figure 8. Comparative carbohydrates values recorded by currant varieties in 2024

CONCLUSIONS

The research carried out looked at the influence of the soil maintenance system on the quality of the fruit from fruit bushes (currant) plantations in the climate and soil conditions of the northwestern Romanian Plain.

The values recorded for the determined biochemical and physical parameters are relatively close between the two soil maintenance systems. The influence of the genetic factor, respectively of the variety, is more significant in relation to the influence of the soil maintenance system, this being valid for the experimental data recorded in 2024.

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