EFFECT OF INOCULATION WITH SYMBIOTIC ENDO- AND ECTOMYCORRHIZAL FUNGI ON PHYSIOLOGICAL PARAMETERS OF SWEET CHERRY LEAVES

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Sweet cherry (Prunus avium L.) is the dominant fruit crop of our region. The relevance of our research is due to the need to develop a sustainable, independent of external resources organic technology for growing sweet cherry. Abandonment of synthetic mineral fertilizers and chemical plant protection products, inoculation of fruit tree roots with endo- and ectomycorrhizal fungi should to promote agroecosystem sustenability. But little is known about the effects of inoculation with symbiotic endo- and ectomycorrhizal fungi on physiological parameters of sweet cherry leaves in organic orchards. The aim of this study was to investigate the effect of endo- and ectomycorrhizal root inoculation on the physiological parameters of sweet cherry trees, in particular, on the physiological parameters of leaves. Our task was to determine the total leaf area, specific leaf density, leaf total moisture content, water-retaining ability, chlorophyll content and ratio in sweet cherry leaves by root inoculation with symbiotic endo- and ectomycorrhizal fungi.

The work was conducted from 2018 to 2020 years in the Southern Steppe of Ukraine in Zelene village near the city of Melitopol (46°46'N, 35°17'E). The soil cover of the investigated area is the chestnut soils, which are very low-humus. Soils have a weakly alkaline reaction of soil solution (pH varies within 7.1-7.4). On the background of a light granulometric composition, the humus content in the upper humus horizon is 0.6%. The analysis of aqueous extraction revealed that the total content of water-soluble salts does not exceed 0.015-0.024%. Mineral nitrogen was not detected, the content of P_2O_5 is 5.4; K_2O - 6.5 mg / kg of soil. Despite the lack of nutrients and low humus content, the soil is quite suitable for growing sweet cherries, which is confirmed

by more than a century of production experience. Soil conditions of the experimental garden are favorable for mycorrhization, as it is shown that the low level of soil nitrogen and phosphorus contributes to the colonization of plant roots by symbiotic fungi [1]. The plant material for the research was the sweet cherry cv. Dilema (Prunus avium L. / Prunus mahaleb), planted in 2011 at 7 × 5 m. The cv. Dilema is a medium-early sweet cherry obtained by crossing cv. Drogan Yellow and Valery Chkalov. The tree is vigorous, forms a spreading, slightly drooping, dense crown. The fruits are convex-heart-shaped, the skin and flesh are dark red, excellent sour-sweet, refreshing taste. It ripens in the conditions of Melitopol in the first decade of June. Orchard rows were oriented north to south. Trees were trained as central leader.

For our fungal treatments we chose MycoApplay Superconcentrate 10 (endomycorrhizal fungi) and MycoApplay Micronized Endo / Ecto (endo-ectomycorrhizal fungi) to inoculate sweet cherry roots. MycoApplay Superconcentrate 10 is a concentrated, thin, suspended material with a particle size of less than 300 μm, containing 10 million endomycorrhizal propagules per pound of 4 species of fungi: Glomus intraradices (modern name Rhizophagus intraradices), Glomus mosseae, Glomus agregatum, Glomus etunicatum [2]. MycoApplay Micronized Endo/Ecto is a concentrated, thin, suspended powder mycorrhizal inoculum with a particle size of less than 300 μm, containing mycorrhizal propagules of 4 species of endomycorrhizal fungi (1 million propagules per pound Glomus intraradices, Glomus mosseae, Glomus agregatum and 7 species of ectomycorrhizal fungi (5.5 million propagules per pound Rhizopogon villosulus, Rhizopogon luteolus, Rhizopogon amylopogon, Rhizopogon fulvigleba; 100 million propagules per pound Pisolithus tinctorius; 5 million propagules per pound Scleroderma cepa and Scleroderma citrinum [2]. The orchard floor was kept under "live mulch" (natural herbs, mowed 4 times during the growing season and the clippings were left on the ground for decomposition). The following treatments were applied: 1. Control - without inoculation; 2. Inoculation of sweet cherry roots with MycoApplay Superconcentrate 10 (root inoculation with endomycorrhizal fungi); 3. Inoculation of sweet cherry roots with MycoApplay Micronized Endo / Ecto (root inoculation with endo-ectomycorrhizal fungi). Any other management was identical in each treatment. Synthetic mineral fertilizers and chemical plantprotection products were not used. The experiment was designed as a randomized complete block with three treatments in four replicates. Each experimental plot contained 4 control trees surrounded by 14 " guard " trees. The physiological parameters of leaves were determined and statistically compared by conventional methods [3-5].

The results of our research show that inoculation with endomycorrhizal fungi increased leaf total moisture content and water-retaining ability than uninoculated trees. The total leaf area at the beginning of the study (1 year) was significantly reduced in endomycorrhizal-inoculated trees, while the specific leaf density was increased (compared to control trees). In the following year, the total leaf area was significantly increased in endomycorrhizal-inoculated trees, and the specific leaf density did not differ significantly from control trees.

Leaf chlorophyll content of mycorrhizal-inoculated trees was significantly decreased compared to control trees, both in 2019 and in 2020. The chlorophyll ratio

(a / b) in 2019 was significantly increased in endomycorrhizal-inoculated trees and significantly decreased in endo-ectomycorrhizal-inoculated trees compared to uninoculated trees. In 2020 chlorophyll ratio (a / b) was significantly lower both in endomycorrhizal-inoculated and endo-ectomycorrhizal-inoculated trees than uninoculated trees. Inoculation of fruit tree roots with endo-ectomycorrhizal fungi did not significantly affect the leaf total moisture content and the total leaf area, but significantly increased the water-retaining ability in the first year of research.

List of references

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