

Application of blue fescue (*Festuca ovina* L.) as living mulch in apple tree cultivation

SUMMARY

The research was conducted in 2014–2017 at the Research and Didactic Station of the Wrocław University of Environmental and Life Sciences. Apple trees of the ‘Ligol’ cultivar grafted on the M.9, M.26, and P 60 rootstocks were planted in spring 2009. The study objective was to determine the possibility of blue fescue (*Festuca ovina* L.) cultivation as a living mulch sown in the tree rows in the second, third, fourth, and fifth year following the establishment of the orchard. The control treatment comprised of herbicide fallow. The evaluation covered living mulch durability and weed infestation development, along with the influence of the latter on apple tree growth, nutrient status, yield, and fruit quality.

The durability of the blue fescue was related to the year of its sowing in the tree rows and to the occurrence of perennial weeds—such as *Glechoma hederacea*, *Taraxacum officinale*, and perennial species from the Poaceae family—in the sod, as observed between the sixth and ninth year following the apple tree planting. The weed communities were initially differentiated with respect to the blue fescue sowing year. They evolved in subsequent years, converging to a large degree. Their specific compositions differed from herbicide fallow weed infestation, which was dominated by temporarily occurring annual species.

Although the living mulch contributed to decreased nitrogen concentration in leaves of the apple trees, most of the time it did not affect significantly the tree growth, regardless of the rootstock. The maintenance of the blue fescue led to significant reduction of total yield obtained from the dwarf apple trees grafted on the M.9 rootstock, as observed between the sixth and ninth year following the tree planting. In contrast, the yielding of the semi-dwarf trees on the M.26 and P 60 rootstocks was unaffected. The presence of the blue fescue did not cause a reduction of fruit mass and size. The living mulch significantly improved the coloration of apples harvested from the trees on the M.9 rootstock. In addition, it contributed to increased contents of fruit fructose and fruit skin phenolic compounds. Significant increases of fruit skin anthocyanin and quercetin concentrations were observed for the apple trees grafted on, respectively, the M.26 and P 60 rootstocks and growing in the blue fescue whose sowing had been delayed to the fourth and fifth year following the planting.

In semi-dwarf orchards that employ the M.26 and P 60 rootstocks and use a blue fescue living mulch as an alternative for herbicide fallow, it is recommended to delay the sowing of the cover crop to at least the third year following the tree planting in order to mitigate the negative influence of the living mulch on the fruit tree.

Key words: orchard floor management, cover crop, fescue, yield, quality