PARAMETERS OF THE CROWNS OF APPLE TREES DEPENDING ON THE FORM OF THE CROWN AND THE TERM OF PRUNING

Andrii Chaploutskyi
PhD in Agriculture, Associate Professor of the Department of Fruit Growing and Viticulture Uman National University of Horticulture, Uman

In terms of planted area, the apple tree occupies the largest area in Ukraine among fruit plantations, and its fruits are a valuable food product with a high content of trace elements, vitamins, pectins and other nutrients [1]. In order to meet the needs of the population in fruit, it is necessary to create new plantations using intensive technologies with the use of dwarf rootstocks, small crown forms, and methods of care [2, 3]. This is because intensive horticulture allows for higher and better yields. This is due to the creation of orchards with a smaller planting scheme, compacting the plantings. In this regard, the development of modern methods of forming and caring for small-sized crown forms that would ensure maximum interception of sunlight, thereby forming fruit wood and better coloured fruits, determines the relevance of these studies [4].

The research was carried out in the plantations of the central Forest-Steppe of Ukraine (Uman National University of Horticulture) in an apple orchard of two varieties: Honey Crisp and Fuji, trees grafted on M.9 rootstock and planted according to the 4x1m planting scheme. The experimental variants included the formation and pruning of three crown shapes: slender spindle (control), French axis and ballerina (with the removal of all shoots on the central conductor above the lower tier of semi-crossbred branches in a 25 cm high zone). The tree crowns were pruned in winter and summer after the June ovary shedding. The soil in the orchard is represented by podzolised heavy loamy black soil, with a drip irrigation system. In the course of this study, field, statistical, and calculation-analytical methods of processing experimental data were used [5]. The research results were processed by analysis of variance using the Statistica software.

A significant dependence of the value of the crown diameter on both its shape and the term of pruning was established. The value of the crown diameter in the plantations of Honey Crisp variety significantly exceeded the corresponding indicator of Fuji variety with the minimum value at two-time pruning of the French axis crown (0.62 m), which was twice lower than the value of the control variant - 1.24 m (LSD_{05}=0.18). The greatest influence on the value of crown diameter was caused by the factor "crown shape" (78.6%).

The volume prevailed in the trees of the Honey Crisp variety and was significantly inferior to the formation of the French axis as a result of the removal of semi-split branches. The volume of the crown in the French axis formation was 0.55 m^3, which is 1.16-1.22 m^3 less than in the other types of formation studied (LSD_{05}=0.12). Also, a 13% (0.16 m^3) decrease in crown volume was facilitated by repeated pruning of trees

in the summer after the June ovary fall.

The projection area of the crown of Fuji trees is inferior to that of Honey Crisp with the maximum dominance of the indicator as a result of the formation of the ballerina crown in winter (1.42 m^2). The formation of the French axis crown in Fuji trees and its pruning twice per season provided the lowest value of the indicator at 0.31 m^2 (LSD_{05}=0.33).

The development of the feeding area prevailed (by 4% points) in the plantation of Honey Crisp. The value of the indicator in the plantations of both studied varieties is much lower as a result of the formation of the French axis crown - 9.4% with more than 73% of the factor's influence on the change in the indicator. The formation of crowns of the slender spindle and ballerina did not differ significantly and ranged from 30.3-31.7%. Due to the combination of winter and summer pruning, it was possible to reduce the value of the indicator by 9%.

Thus, Honey Crisp trees significantly outperformed Fuji trees in terms of diameter, crown volume, crown projection area, and nutrient area utilisation. A significant decrease in the values of the indicators was achieved with the introduction of the French axis crown shape.

References

1. Chyzh, O.D., Filiov, V.V., Havryliuk, O.M., & Chukhil, S.M. (2008). Intensive apple orchards. Kyiv: Ahrarna nauka.
2. Conesa M.R., Martínez-López L., Conejero W., Vera J., Ruiz-Sánchez M.C. (2019). Summer pruning of early-maturing. Prunus persica: Water implications. Scientia Horticulturae, Volume 256, 15, https://doi.org/10.1016/j.scienta.2019.05.066
3. Franzen, J.B. and Hirst, P.M. (2016). Optimal pruning of apple and effects on tree architecture, productivity, and fruit quality. Acta Horticulturae. 1130, 307-310 https://doi.org/10.17660/ActaHortic.2016.1130.45
4. Fura A. (2012) Cięcie drzew ziarnkowych zimą. Informator Sadowniczy. №2.
5. Kondratenko P.V., Bagel M.O. (1999) Methodology of conducting research with fruit crops. Agrarian science