FEATURES OF THE GROWTH OF SHOOTS OF APPLE TREES DEPENDING ON THE SHAPE OF THE CROWN AND THE TERM OF PRUNING

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The productivity of garden crops depends on the amount of light energy intercepted. This limitation is determined by the planning of the row direction and the shape of the crown [1].

According to Tustin, D.S. [2] the solution to this problem in the further intensification of horticulture should be aimed at the use of small, narrow crowns, which can increase the biological potential of fruit plants as a result of better illumination of the middle of the crown. According to Breen, K.C., [3]., it is the high level of illumination inside the crown that is the key to achieving optimal yield and high quality fruit. The main determining factors are the planting scheme, crown shape and tree height [4] which are closely correlated with the level of illumination [5].

The study of the methods of formation and timing of pruning of small-sized forms of the crown of apple trees began in the spring of 2019 in the experimental garden of the Uman National University of Horticulture. The orchard was established in the spring of 2015 with Fuji and Honey Crisp varieties grafted on dwarf rootstock M.9 T337. The planting scheme of the studied trees is 4x1 m, the soil type is black soil sod-podzolic. The studied trees were pruned in two terms: in winter (0 BBCH) and twice during the growing season: in winter and summer after the June ovary shedding (II decade of June, 74 BBCH), forming a crown: slender spindle, ballerina (with the removal of overgrown wood on the central conductor, in the 25 cm zone above the tier of semi-crossbred branches) and French axis.

Phytometric measurements were made according to generally accepted recommendations and research methods. The increase in bole diameter was recorded as the difference in values between adjacent years measured with a caliper at a bole height of 30 cm from the soil level. The length and number of annual shoots longer than 5 cm were measured after the end of growth with a measuring tape from the annual ring to the top of the shoot growth cone. The total length of the shoots was calculated by multiplying the average length of the shoots by their total number on the tree.

The most active shoot formation, as a reaction to the introduced methods and timing of pruning, was found in Fuji trees with two-time pruning of the crown of the slender spindle and ballerina in 54 newly formed shoots per tree. While the winter pruning of the French axis crown provided only the formation of 36 shoots (LSD_{05}=11). According to the analysis of variance, during the experiment and the annual consistent growth and development of plants, there was a tendency to gradually increase the number of newly formed shoots by 11-12% compared to the previous season. The

shoot-forming ability of Fuji trees significantly exceeded the value of Honeoye Crisp, 47 pcs./dar against 43 pcs./dar, respectively ($LSD_{05}5=2$). The formation and subsequent pruning of the French axis crown contributed to a significant weakening of the growth activity of the studied trees and provided a quarter reduction in the number of annual shoots compared to other crown forms that were studied.

The predominant influence on the change in the number of shoots was caused by the factor "year of research" by 22% and "crown shape" by 21%. The pomological characteristics of the variety influenced the nature of the number of shoots formation only by 5%.

The formation of the French axis crown and its subsequent pruning during the dormant period activated the growth force of shoots and provided their greatest length in both studied varieties. On the other hand, two-time pruning of trees in the shape of the ballerina crown significantly slowed down the growth force of the plantations, forming shoots of 14.7-17.3 cm. During the research period, with an annual increase in the number of shoots, their length decreased from an average of 26.8 cm at the beginning of the experiment to 22.5 cm at the end of the experiment (a difference of 16%). Peculiarities of the pomological variety Honei Crisp provided 26% of the shoot length predominance compared to the corresponding indicator of the variety Fuji. Also, the increase in shoot growth force was facilitated by the introduction of the French axis crown shape and averaged 29.3 cm in the experiment, which was a quarter higher than the results obtained as a result of the formation of the crown of a slender spindle and twice as much as the formation of the ballerina crown, which recorded the lowest values of the studied indicator. Also, the repeated pruning of trees in the early summer period contributed to a significant restraint of shoot growth. Thus, two-time pruning of trees in winter and early summer provided a decrease in the length of shoots by 4.5 cm (17%), $LSD_{05}=1$.

The total length of shoots (Fig. 1 d) in the experiment as a whole increased with the age of the plantations and significantly depended on the pomological variety (influence of the factor 10%). In trees of the Honeoye Crisp variety, the value of the indicator was 15% higher compared to the Fuji variety. As a result of the formation of the French axis crown and the activation of growth processes, the total length of shoots increased to 11.3 m/d (influence of the factor 12%), while with an increase in yield and a decrease in shoot length, the formation of the ballerina crown, the total length of shoots decreased to 9.3 m/d ($LSD_{05}=0.7$). The weakening of apple trees growth of both studied varieties by 12% was facilitated by the implementation of two-time crown pruning.

References

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