

Flower production of apple varieties grown by different environmental technologies

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Summary: The flower production of four apple varieties have been observed grown in integrated and in ecological growing technologies during the spring of 2010. The trees produced in the last year (2009) nearly similar yields, so the effect of the technologies may cause differences in the production of flowers. According to our results, the ecological technology produced higher flower densities in the majority of variables, which was in relation with the vigor, branching and thickening of the trunks. The varieties observed displayed substantial differences in the appearance of fruiting structures of different age on the branches. This information may prove to be essential for the decisions to be made in timing and severity at the pruning operations.

Key words: apple varieties, integrated, ecological technology, fruiting bodies, flower density

Introduction

The technologies distinguished as integrated and ecological, influence the condition of trees and are expressed in the vigor and fruiting. The ecological technology excluded the use of synthetic substances (phytosanitation and fertiliser), which are influencing the growth and the components of the condition. In the integrated technology, on the other hand, with their exaggerated effect may induce intense vegetative activity as a sign of deleterious conditions. According to Zatyko's (1980) thoughtful definition, condition means a sensitive balance between the vegetative activity and the supply of assimilates, which is called to be optimal, if they are in harmony with each other. Among the technological moments, pruning is considered to be the most potent tool to achieve the optimal balance Gonda (2000, 2004) and Holb (2005). Being aware of the utility and purpose of the individual technological elements, we have to choose the intensity of pruning, the intensity of phytosanitation and the thinning of fruits set. An optimal crown structure, physiological condition and the cross section area indices of the trunk and the branches are often treated by Zahn (1986, 1994) in his studies.

The present study refers to 13 year old plantation, which was held under the regime of integrated and ecological rules of technology. Four apple varieties were represented in the plantation. They were compared by adequate pruning and observed as for their production of flowers.

Materials and methods

In the Study Farm and Regional Research Farm, Pállag of the Debrecen University, the experimental orchard was planted in 1997. One part for integrated technology, the other part for

ecological. The apple varieties planted were: REWENA, REMO, PILOT and a widely grown JONAGOLD (JONICA). The planting design was 4×1.5 m, which means a density of 1666 trees per hectare. The rootstock used was M26. The sunshine hours per year of the growing site was 1900–2050, the mean temperature $10\text{--}11^\circ\text{C}$, the minimum -30°C and the maximum $+35\text{--}38^\circ\text{C}$, precipitation 500–600 mm/year with irregular distribution. The humus is less than 1%, the sandy soil is slightly sour, the heaviness according Arany is about 25.

Observations are performed in 2010 during the period April 20–30, the main bloom of apple. Five trees were selected per variety for measurement, stating the condition, growing vigor, trunk circumference, and on a chosen branch of first degree, earlier selected fruiting structures were assigned.

Presentation of the results

The development of flowers was expressed not only in the number of inflorescences, but also the propriety of the variety and the consequences of the growing technology, and the condition of the individual tree. In Figure 1, the number of inflorescences are compared as they were found at the beginning of the study. Each variety was represented by the both growing technologies and referred to the cross section area of the respective branches.

In Figure 1, it is easy to state that differences are caused first of all by genetic causes but also the technological moments are conspicuous. Few inflorescences are found in REWENA and most in PILOT, the difference being more than four fold. In REWENA, the effect of technology was nearly two fold (1.7 and 3.3). In the majority of varieties, the ecological technology produced more inflorescences, whereas in REMO the integrated causing better condition (6.5 and 3.6).

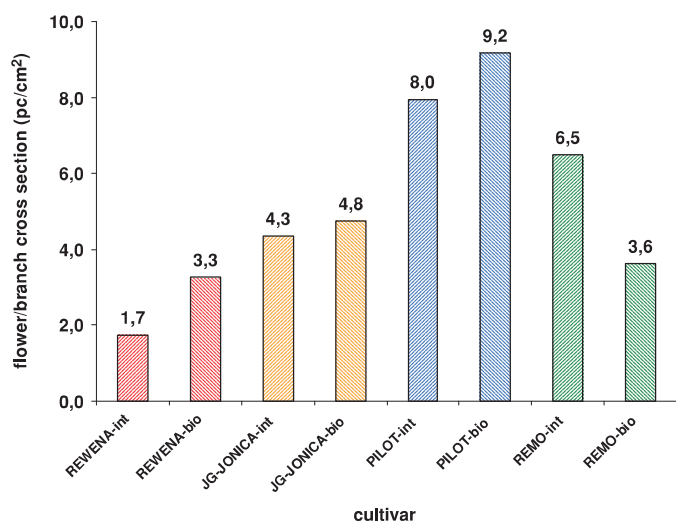


Figure 1. The number of inflorescences per cross section area of four apple varieties grown according to different growing technologies (Debrecen-Pallag, 2010)

However, the number of inflorescences per cross section area of the branches are only partially determining the fruiting potential of the tree. Authors attribute important role to the age of the fruiting structures within the crown. In Figure 2, the variety PILOT is shown how the inflorescences are distributed among the age of the fruiting structures and also the influence of the technologies is visible.

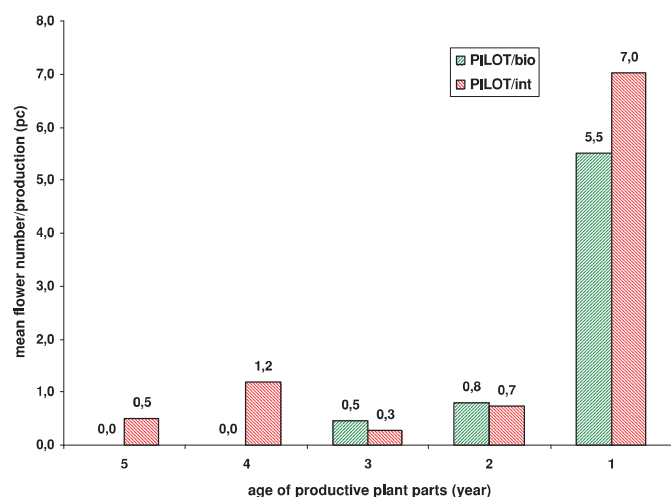


Figure 2. Number of inflorescences on the fruiting structures of different age on the variety PILOT depending also on the growing technology (Debrecen-Pallag, 2010)

In Figure 2, it is evident that the variety PILOT is blooming preferably on the young (long) shoots. Comparing the effect of technologies, the integrated seems to be more favorable for the inflorescences on the aging parts of the branches too going to 5-year-old parts, whereas in the 2 or 3 year old parts the difference was negligible. The lack of inflorescences in the 4–5 year old parts is remarkable and should be considered in the pruning policy of the respective variety.

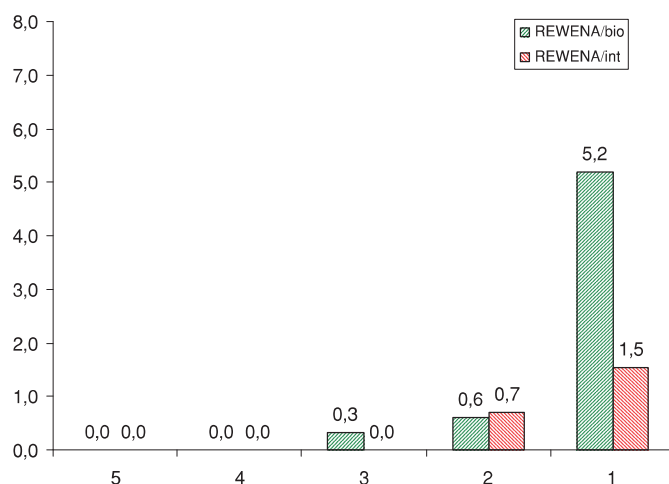


Figure 3. Number of inflorescences on the fruiting structures of different age on the variety REWENA depending also on the growing technology (Debrecen-Pallag, 2010)

Comparing the variety PILOT with REWENA, the difference is suggestive. The small number of inflorescences and the beneficial effect of the biological (ecological) technology is evident also producing flowers on the 3-years-old structure. The tendency of the variety to get bald is clearly demonstrated in 3 and 4 year old parts also in both technologies.

In Figure 4, the REMO variety is presented showing also its reaction to the different growing technologies.

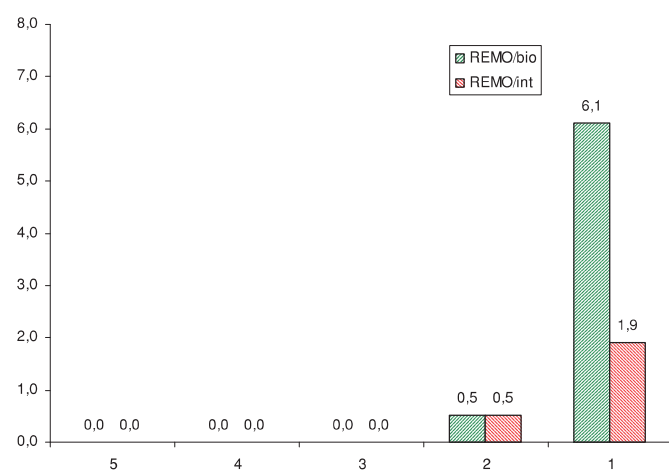


Figure 4. Number of inflorescences on the fruiting structures of different age on the variety REMO depending also on the growing technology (Debrecen-Pallag, 2010)

REMO developed flower on the first and second year old structures only. In ecological technology, the high frequency of flowers was found, threefold more than in integrated technology. The variety seems to be inclined not to produce flowers beyond 3-year old structures independently from the technologies.

In the variety of JONICA, the ecological technology showed its superiority in flower production over the integrated one in the one year old structures. It is of special

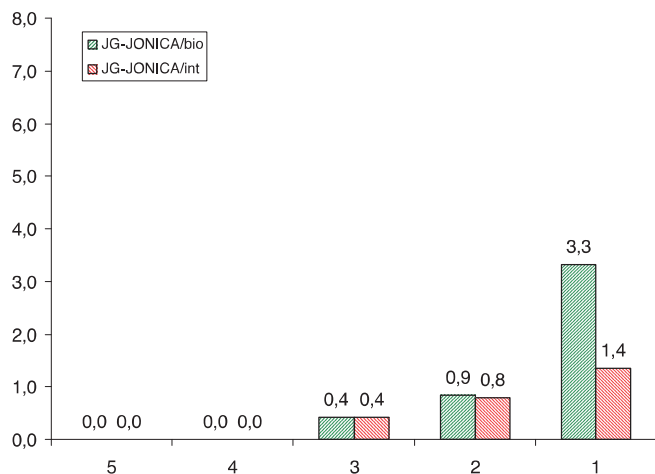


Figure 5. Number of inflorescences on the fruiting structures of different age on the variety JONICA depending also on the growing technology (Debrecen-Pallag, 2010)

interest that the relatively low number of inflorescences and their lack on older (4 and 5 year old) structures was unexpected on the basis of the otherwise popular variety belonging to the JONAGOLD group of varieties.

Conclusions

As experienced from the observations, the varieties showed remarkable differences in the spring of 2010 also depending on the two alternative growing technologies. In three varieties, the ecological technology was more favorable, the only exception was REMO showing the

opposite. In the integrated technology, the condition of the trees, their vigor (the cross section area of trunks and branches) was stronger due to the technology, therefore the specific parameters, inflorescence per area, got lower values. The opposite reaction of the variety REMO shows unambiguously the advantage of the integrated technology revealed differently in the growth of the trees.

The differences between the flower production of the varieties calls our attention to the necessity of applying different policies in rejuvenation of varieties. In REMO, JONICA and REWENA, the fruiting structure older than 3 years ought to be eliminated returning each third or fourth year. Exception being PILOT, which was able to bear on older parts of the branches.

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