
**INFLUENCE FOLIAR FERTILIZATION IN CONJUNCTION WITH
FRUIT THINNING ON APPLE PRODUCTIVITY IDARED VARIETY**

Balan V.¹, Vămășescu S.¹, Ivanov I.¹

Keywords: *Fertilizer, Idared, Thinning, Urea.*

ABSTRACT

Fruit thinning is a major influence on high production next year, extra quality fruit this year.

The company's apple orchard S.A. Zubresti have been investigated by a combination of fruit thinning of 10 - 12 and 16 - 18 mm in the central flower of the application of foliar fertilization with 46% Urea N in doses ranging from 0.4 - 1.2%, Polyfeen (19 : 19:19 + 6 elements) at a dose of 0.1%, CaCl₂ at a dosage of 0,5 - 0,7%.

The number of the variety of Idared fruit research during the years increased from 155 units to 233 units followed by growth until harvest per hectare to 57.2 t in variant with foliar fertilization with the concentration of 0.6%, 0.9%, 1.2% and more, when the fruit center thinning is 10 to 12 mm in diameter.

INTRODUCTION

Foliar fertilization, chemical and manual fruit thinning are significant contribution, to maintain physiological balance between growth and fruiting also the quantity and the quality of fruit. (V. Balan, 2009)

The thinning of trees and the sprinkling of flowers is accomplished during or after flowering with chemicals that destroy pollen, unfertilized flowers, stigmas and embryo of seeds from the fruit barely related.

Fruit thinning is the removal of a number of apples than the optimum number of fruits per tree. The optimal number of apples per tree allows obtaining high yields, necessary commercial aspect, color characteristic of the variety, taste and flavor appropriate and also ensures favorable conditions for the formation and differentiation of flowering buds. (Cimpoieș. Gh, 2012)

The number of apples on a fruit tree is optimal if leaves are well-developed 30-50 cm² or a cross-sectional area of the trunk 5-7 fruits (Babuc V., Rusu. T., 1997).

The thinning apples is realized by chemical and manual thinning.

Hungary uses chemical thinning effect of auxin and ethylene. The most effective are alpha-and alpha-naphthylacetamide naphthylacetic (Babuc V., 2012).

¹ Agrarian State University of Moldova, Faculty of Horticulture, 42 Mircesti Street, Chisinau, MD 2049, Moldavia; v.balan@uasm.md

The chemical thinning reduces the need of expensive labor force, but also the use products of polluting chemical thinning. Another disadvantage is that the crown fruit thinning is uniform.

Hand thinning of fruit is the safest and the most effective method. It provides a uniform thinning of fruits, and an optimal number of apples. Also it's not polluting method, but this method is very thorough, requiring 20-40 days / ha for a short time (Cimpoieș Gh, 2012).

The formation in apple harvest takes place over two growing seasons separated by a period of rest. In the second growing season linking occurs, growth and fruit maturation. Linking fruit going through the reserve substances accumulated in the tissues of the previous year because of the trees bloom before the leaves form aces or when they are poorly developed (Balan V., et al. 2001).

MATERIALS AND METHODS

We studied the interaction of foliar fertilization and fruit thinning, as key determinants of the quantity and quality of apple fruit.

Table 1

Scheme applying foliar fertilizers apple variety Idared

Nr.	The period of effect foliar fertilization	Foliage fertilizer concentration			
		V1f	V2f	V3f	V4f
Urea 46 %N active substance					
1	After bloom (when the 75% where in bloom)	water	0.4	0.5	0.6
2	When the fruit has the size of one nut (fruit have 10-12 mm in diameter)	water	0.7	0.8	0.9
3	When the fruit has the size of one walnut (fruit have 25-30mm in diameter)	water	1.0	1.1	1.2
Polyfeed (N19:P19:K19)					
4	When fruits has the ripen stage (20-30 July)	water	0.1	0.1	0.1
Calcium chloride(CaCl2)					
5	With 20-30 days before harvest	water	0.5	0,6	0,7

The influence the study of fruit load thinning processes of growth and fruiting in apple orchard covered the period of 2011-2012 organized in a apple orchard in SA "Zubresti" Strășeni district. We studied Idared apple variety, grafted on rootstock M 26, planted in 2003, at a distance of 4 m between rows and 2 m between trees in a row. Treatments were applied with 46% N urea Concentrate from 0.4% to 1.2% by adjustable single phase of growth (Tab. 1) when the temperature was 16-18°C. Each variant consisted of four repetitions of each three trees, arranged by randomized block system. Chemical fruit thinning was achieved when the central fruit has 10-12 mm in diameter (Tab 2) the preparation Bioprzerzedzacz 060SL is consuming 0.075% by 7.5 ml per 10 liters of water for 12 trees and 1000 l solution per hectare respectively.

The hand thinning of fruit is usually made in June until July 5 to 10 that is no later than 30 days after the bound. This thinning has a role in improving fruit size and quality. Thinning is leaving one fruit inflorescence 10-15 cm from each other. Remove the first small fruit, deformities, diseases and then to normal attack.

The stabilities for each tree harvest is separate from the production weighing 24 trees and making the arithmetic mean. The average weight of the fruit is determined by weighing with a balance of the 100 apples, which are both formed and the degree of maturity.

The experiment was mounted on the plane of rotation in accordance with the method of organizing experiences factorial (foliar fertilization, thinning chemical and mixed manually fruit) and included variants with the following scheme for the use of foliar

Table 2

Fruit thinning methods.

Variant	Fruit thinning methods
V _{1r} (control)	Untreated.
V _{2r} (chemical thinning).	Managing chemicals when the fruit diameter central inflorescence is 10-12 mm.
V _{3r} (chemical thinning + manual thinning).	Managing chemicals when fruit diameter of the central inflorescence is 10-12 mm. Fruit thinning is performed manually by physiological fall when the fruits have 16-18 mm in diameter.
V _{4r} (manual thinning).	Fruit thinning is performed manually by physiological fall when the fruits have 16-18 mm in diameter.

fertilizers and methods of thinning the fruit: V1 (V1f + V1R), V2 (V1f + V2R) V3 (V1f + V3r) V4 (V1f + V4R), V5 (V2F + V1R) V6 (V2F + V2R) V7 (V2F + V3r) V8 (V2F + V4R) V9 (V3f + V1R) , V10 (V3f + V2R) V11 (V3f + V3r) V12 (V3f + V4R) V13 (V4f + V1R) V14 (V4f + V2R) V15 (V4f + V3r) V16 (V4f + V4R);

RESULTS AND DISCUSSIONS

In 2011 the number of fruit per cultivar Idared was included in a range of 115 units in version V 3f - 4r and 186 units in version V3f -1r.

The fruit number in 2012 increased in all variants. The smallest increase was recorded in control with an increase of 29 units and fruit was 184 and the highest increase was recorded in the variant V 4f-1r with 233 units with an increase of more than 38 units in 2011. A significant increase was recorded without fertilization and fruit thinning where no fruit has greatly increased from 20 units with manual fruit thinning V 1f-4r and amounted to 36 units to 200 units invariant V1f - 2r with chemical thinning fruit and constituted 202 units.

In under variants with foliar fertilization notice that the number of fruit is lower than the version where only fertilization foliar applied urea 46% N as planned experience, it is because influence thinning load bearing trees by applying the three methods of thinning fruits that are chemical thinning, mixed fruit and manual.

Even if the number of remaining fruit is the same as in the control, they are more qualitative due to the application of foliar fertilization increases leaf area needed to develop fruit from the tree.

The biggest difference between variants of fertilization and thinning fruit is variable V 3f where the sub-variants with manual fruit thinning V 3f-4r joined 167units.

The difference between the control V 1f - 1r and variants thinning and without foliar fertilization is 28% but the difference between thinning without fertilization variants is less than 1.2% of the variants V 1f - 1f 2r and variant V - 3r 4 3% of variants V 1f - 2r and manual fruit thinning variant V 1f - 4r.

In 2012, the fruit weight increased in all variants studied.

The variants without fertilization and fruit thinning, fruit weight is between 180 g chemical fruit thinning version and 188 g version with manual thinning fruit.

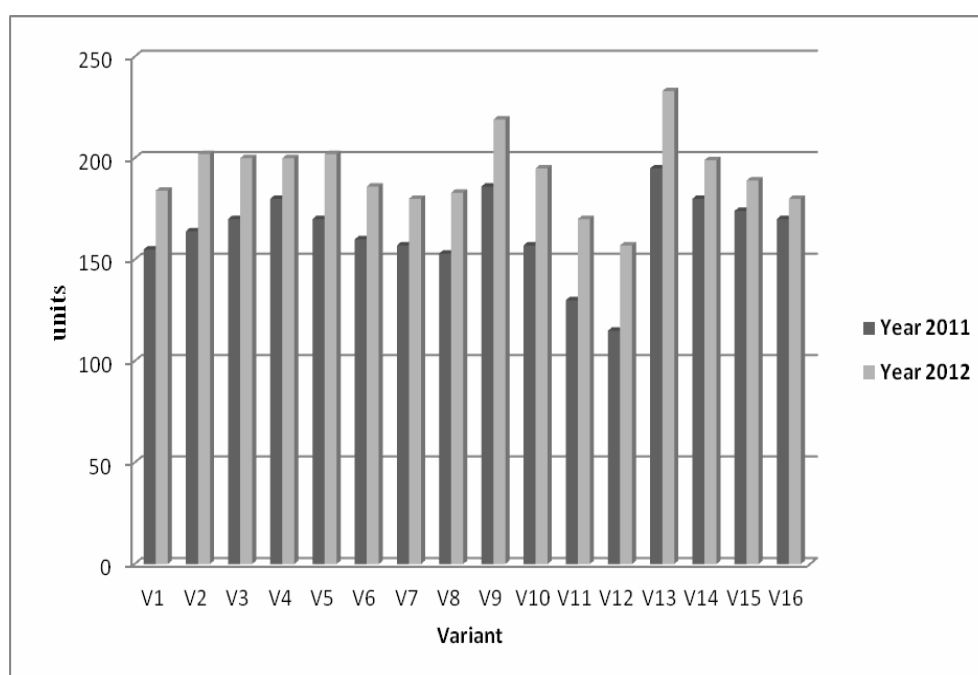


Figure 1. The number of fruit per cultivar Idared apple trees by thinning fruit and foliar fertilization with mineral fertilizer application, pieces.
(Rootstock M26, 4x2m planting distance, trees age 8-9 years, SA "Zubresti")

The variable V 2f where the concentration of urea applied is 46% N 0.4%, 0.7%, 1.0%, mean fruit weight was 152 g, but the foliar fertilization beside the normalization with the application of the load bearing, greatly increased fruit weight of 197 g fruit chemical thinning with 200 g under variants V 2f-3r and V 2f-4r where applied mixed fruit thinning and thinning manual.

The highest fruit weight was recorded version V 4f-1r where the Urea 46% N concentration is 0.6%, 0.9%, 1.2% with 158 g. In under variants where to apply thinning fruit weight is 230 g in the chemical thinning fruit with the lowest fruit weight was recorded without thinning the fruit 215g.

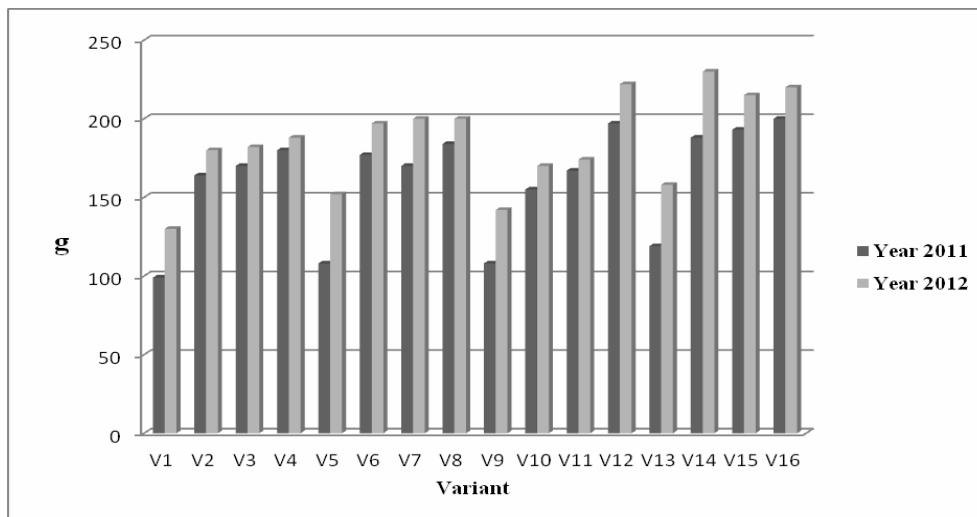


Figure 2. The weight of fruit from the cultivar Idared apple trees by thinning fruit and foliar fertilization with mineral fertilizer application, g., (Rootstock M26, 4x2m planting distance, trees age 8-9 years, SA "Zubresti")

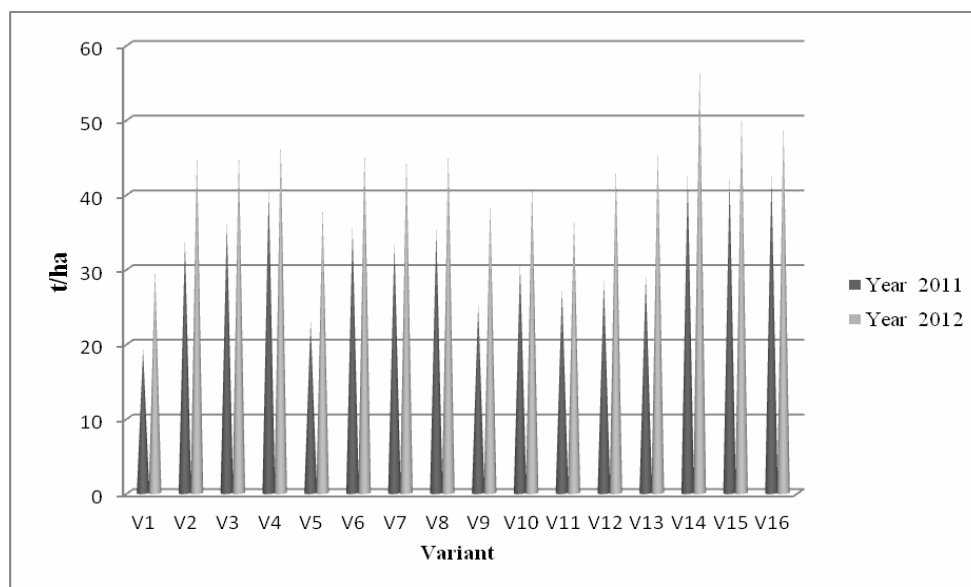


Figure 3. The production of fruit by thinning Idared variety of fruits and application of foliar fertilization with mineral fertilizers, t / ha. (Rootstock M26, 4x2m planting distance, trees age 8-9 years, SA "Zubresti")

The fruit production per hectare is determined by the amount of fruit on a tree, so the least amount of fruits was recorded in the control to 29.9 t / ha and the highest in version V2r - 4f 57.2 t / ha.

The fruit harvest variants of foliar fertilization without thinning fruit increases with a concentration of Urea 46% N applied as in variant V2f -1r fruit harvest was 38.4 t / ha then V4f-1r variant where the concentration of fertilizer is a maximum of 0.6%, 0.9%, 1.2% fruit crops was 46.0 t / ha.

In all variants yield is higher than in variants without fertilization and fruit thinning. In the variant with manual fruit thinning and fertilization with urea 46% N V 1f - 4r fruit harvest is 47.0 t / ha, chemical fruit thinning variant V 1f-2r harvest in 2012 was 45.4 t / ha.

In 2011 - 2012 the lowest crop per hectare was recorded in the control V 1f-1r without fertilization and fruit thinning 24.5 t / ha, and the largest in variant V4f -2r 49.8 t / ha.

CONCLUSIONS

The value of fruit depends largely on: Administration fertilizers Urea 46% as active substance polyfeed (N19: P19: K19) and calcium chloride (CaCl₂) that contribute to increase the fruit yield.

The fruit thinning has also a great importance on the quantity of the production of apples. The highest yield per unit area was recorded in the V14 version with 57.70 tons hectare where the foliar fertilization was applied at a concentration of 0.6% -1.2% in the growing phase and chemical fruit thinning stage 10 -12 mm of the central fruit blossom, and the lowest yield was recorded in control V1 which did not apply any method of thinning.

The foliar fertilization and the thinning fruits are valuable agronomic processes, which determine the quantity of the production scheduled for harvest as well as stability in the future.

REFERENCES

- Babuc. V., 2012, Pomicultura, Editura Tipografia Centrala Chisinau, 417 p.
Balan. V., Barbăroșie. M., Cimpoieș. Gh., 2001, Pomicultura, Editura Museum, Chisinau, 452 p.
Balan V., 2009, Sisteme de cultură în pomicultură. Randamentul producției de fructe. Academos, Chișinău, nr 4 (15), p. 82-90.
Cimpoieș Gh., 2012, Cultura mărului, Chișinău, Editura Bons Offices, 237p.