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PRODUCTIVITY OF THE IDARED APPLE VARIETY DEPENDING ON THE CROP LOAD AT THE FRUIT THINNING

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Abstract

The experimental plot is placed in the orchard "Codru-ST" Ltd. founded in 2006. The study subject of the experience was Idared apple variety grafted on M 9 rootstock. The plant spacing is 3.5 x 1.2 m. The research was conducted during the period of 2014-2017 years. The active substances applied were NAD (Geramid-New), NAA (Dirager) and BA (Gerba 4 LG), using different doses and different thinning periods. During the research, such indicators as the number and average weight of the fruit, the yield per tree and per unit area and the average fruit diameter were studied. It was established that, the spray with Geramid-New in dose 1.2 l/ha when 80% of the petals have fallen + 2-3 days, Dirager in dose 0.2 l/ha when the king fruit diameter was 8-9 mm, and Gerba 4 LG in dose 2.0 l/ha when the king fruit diameter was 10-12 mm have a significant effect on the number of the fruits, average weight, yield and fruits diameter.

Key words*: Growth regulators, thinning, average weight, yield, fruits diameter.*

INTRODUCTION

The Idared variety is one of the most cultivated red apple varieties in the Republic of Moldova (Babuc et al., 2013; Balan & Vămășescu, 2011; Cimpoieș, 2012; Pește anu, 2015). The Idared variety flowers abundantly and regularly on all types of fruiting branches forming high yields, but in some years of lower quality (Ambrozic Turk & Stopar, 2010; Pește anu, 2015). In order to exclude this negative phenomenon, it is recommended to carry out the reduction of the fruit load by different thinning methods, (manual, chemical) with different growth regulators and different treatment doses (Greene, 2002; Ilie et al., 2016; Pește anu, 2013; Pește anu, 2015; Pește anu & Calestru, 2015; Pește anu & Calestru, 2020)

Therefore, at the initial stage, in apple orchards the fruit load of the trees is optimized by chemical method and then, if necessary, the number of fruits is corrected by manual method depending on the degree of development and physiological condition of the plants (Balan & Vămășescu, 2013; Basak, 2004; Pește anu, 2015).

The chemical reduction of the reproductive organs is also studied by many researchers for various apple varieties, but no such research has been carried out for Idared, as it is grown only in CIS countries. To solve this problem, it is necessary to study the use of different growth regulators whose active ingredient are NAD, ANA and BA based products, which allow to perform treatments from petal fall until the central fruit in the inflorescence has a diameter of 15 mm (Balan & Vămășescu, 2013; Basak, 2004; Ilie et al., 2016; Pește anu, 2013; Pește anu & Calestru, 2017).

MATERIALS AND METHODS

The experiments on which the PhD thesis is based were organized in the period 2014-2017, in the intensive apple orchard of the "Codru-ST" Ltd. company, planted near the village of Păulești, Călărași district. The plantation was founded in autumn 2006, with one year old trees.

The Idared variety grafted on rootstock M9 was taken as the object of study. The crown was trained according to the improved thin spindle system, planting distance 3.5 x 1.2 m.

To determine the fruit thinning efficiency of Idared trees, growth regulators based on NAD, ANA and BA, produced by 'L.Gobbi' SRL, Italy, were used and the following experiment was set up (Table 1).

The research was carried out according to the general methods of carrying out experiments with fruit species both in the field and the laboratory.

Table 1. Experimental scheme for thinning method and treatment dose of apple trees with growth regulators

Variants of the experiment	Activ ingredie nt	Treat ment dose, l/ha	Aplication
Without thinning (control)	-	-	-
Hand thinning	-	-	Manual thinning after physiological fall, when the central fruit reaches 15-20 mm in diameter.
Geramid New	NAD (44.8 g/l)	1.2	By spraying, at 80% petal fall +2-3 days, when the central fruit reaches 4-7 mm in diameter.
		1.5	
		2.0	
Dirager	ANA (37g/l)	0.2	By spraying, when the central fruit reaches 8-9 mm in diameter
		0.3	
		0.4	
Gerba 4 LG	6BA (41g/l)	2.0	By spraying, when the central fruit reaches 10-15 mm in diameter.

Trees were treated with portable sprayers during windless hours, in the morning, above +18°C. The amount of solution per tree was 0.4-0.5 liters, based on the number of trees per unit area and the recommended water quantity of 1000 l/ha.

Records for determining the number of fruits, average weight of a fruit, yield per tree and per unit area, and fruit diameter were established at harvest time. The results were reported to the control.

RESULTS AND DISCUSSIONS

The number of fruits on a tree results from the number of flowers and the setting coefficient depending on how the fruit load is managed and the dose applied on each individual growth regulator.

The data in Table 2 show that the number of fruits was directly correlated with the factors taken into account in the study. A higher number of fruits in Idared trees was recorded on the variants under study in 2016. In 2014-2015 the number of fruits was at the level of the multi-year average on the variants under study, except for the variant without thinning. In this variant, in 2014 a higher number of fruits was recorded (210 pcs/tree), and in 2015 there was a clear influence in the crown of the alternation of fruiting (87 pcs/tree), which finally influenced the multiannual average index (157 pcs/tree).

In 2017 the difference between years in terms of the number of fruits on a tree shows lower values of the index under study, based on the higher number of fruits in the previous year (2016).

Table 2. Influence of growth regulators and treatment dose on the number of fruit in the crown of Idared apple trees, pcs/tree

Variants of the experiment	Treat ment dose (l/ha)	Years				Avera ge 2014-2017
		2014	2015	2016	2017	
Without thinning (control)	-	210	87	258	73	157.0
Hand thinning	-	110	113	116	110	112.2
Geramid New	1.2	128	136	140	117	130.5
	1.5	110	117	113	89	107.2
	2.0	94	87	90	80	87.7
Dirager	0.2	116	113	124	101	113.5
	0.3	95	92	101	80	92.0
	0.4	74	77	85	76	78.0
Gerba 4 LG	2.0	96	100	104	89	97.2
	2.5	69	74	80	71	77.5
	3.0	54	66	70	51	60.2
Average	-	105.1	96.5	116.4	85.2	-

The number of fruits on a tree also varies significantly depending on how the fruit load is managed during the research. In the no thinning variant the number of fruits per tree after the multi-year average was higher (157 pcs/tree) compared to the manual thinning variant (112.2 pcs/tree). In the variants with chemical thinning, the index under study was correlated with the product used for thinning. Depending on the way of the fruit load management, during the research an variable number was scored in the control variant, without thinning, when partial alternation of fruiting is clearly observed, i.e. in one year (2014; 2016) a high number of fruits in the tree and in another very low. The number of fruits in the manual thinning variant was constant throughout the research and did not vary essentially from the multi-year average value, as the aim was to keep 110-115 pcs/tree in the crown.

The growth regulators used in chemical thinning of reproductive organs during the research had its contribution on the average

number of fruits in trees. A higher number of fruits per tree was scored when treated with the growth regulator Geramid New (87.7-130.5 pcs/tree) compared to the product Dirager (113.5-78.0 pcs/tree). The lowest number of fruits per tree was obtained when using the growth regulator Gerba 4 LG (97.2-60.2 pcs/tree). The different number of fruits in Idared apple trees can be explained by the action of each active substance on the blocking of seed development in the seed chamber of the fruit and the climatic conditions that were recorded during the treatment period.

Since it is known that Idared belongs to the category of varieties in which the reproductive organs are easily chemically thined, different treatment doses from those recommended for apple cultivation in the conditions of the Republic of Moldova were also studied.

If, for example, the average number of fruits in the years 2014-2017 in the variant Geramid New 1.2 l/ha was 130.5 pcs/tree, then in the variant Geramid New 1.5 l/ha the value of this index was 107.2 pcs/tree, an approximate value with the manual thinning variant. Increasing the treatment dose of Geramid New to 2.0 l/ha essentially decreased the number of fruit in the trees, the index in the study being 87.7 pcs/tree.

The highest value in the variants where Dirager was applied was recorded in the variant treated with 0.2 l/ha. In the case of that variant, an average of 113.5 pcs/tree remained in the crown of the trees, and in the variants with increased treatment dose, the number of fruits per tree was decreasing. Thus, the Dirager 0.3 l/ha variant had 92.0 pieces of fruit per tree, while the Dirager 0.4 l/ha variant had 78.0 pieces or a decrease compared to the Dirager 0.2 l/ha variant by 19.5 and 31.3% respectively. In the case of the variants treated with the growth regulator Gerba 4 LG there is a major decrease compared to the variants treated with Geramid New and Dirager.

The lowest number of fruits per tree when treated with Gerba 4 LG was obtained in the 3.0 l/ha (60.2 pcs/tree) dose variant, then higher values of the index in the study were recorded in the 2.5 l/ha (77.5 pcs/tree) dose variant. A higher number of fruits in the Gerba 4 LG treated variants was scored in the 2.0 l/ha dose (97.2 pcs/tree), but clearly lower in the Geramid New 1.2 l/ha, Geramid New 1.5 l/ha and Dirager 0.2 l/ha variants.

The average weight of a fruit as an indicator of quality (Table 3), varied greatly over the years studied in Idared trees. The highest average weight of a fruit was recorded in 2017 (201.3 g) and the lowest in 2016 (179.4 g). During 2014 and 2015 the average weight of a fruit recorded average values, constituting 185.1 and 191.4 g, respectively. This indicator largely correlates with the number of fruit obtained per tree and the weather conditions in the reference year.

Table 3. Influence of growth regulators and treatment dose on the average weight of a fruit in the crown of Idared apple trees, g

Variants of the experiment	Treatment dose (l/ha)	Years				Average 2014-2017
		2014	2015	2016	2017	
Without thinning (control)	-	103.9	189.7	95.5	220.1	152.3
Hand thinning	-	172.7	169.1	167.5	172.0	170.3
Geramid New	1.2	157.4	155.7	151.3	169.5	158.5
	1.5	174.3	169.5	186.0	192.1	180.5
	2.0	195.8	199.4	195.3	201.3	197.9
Dirager	0.2	168.7	170.9	158.3	191.7	172.4
	0.3	198.1	193.5	191.6	205.1	197.1
	0.4	217.3	215.1	199.7	216.3	212.1
Gerba 4 LG	2.0	194.4	192.3	194.1	195.7	194.1
	2.5	227.3	222.6	207.7	218.3	218.9
	3.0	230.4	228.0	226.8	232.1	229.3
Average	-	185.5	191.4	179.4	201.3	-

The average weight of a fruit also changes under the influence of the fruit load management method. Lower values of the given index were recorded in the variant without thinning (152.3 g) compared to the other variants (158.5-229.3 g). The essential discrepancy in the control variant on the studied index is explained by the different number of fruits per year of research. A lower fruit weight was obtained in 2015 and 2016 constituting 103.9 and 95.5 g, respectively, with very high fruit values recorded in 2015 (189.7 g) and 2017 (220.1 g). This phenomenon was recorded as a result of the alternation of fruiting, which in Idared is not as pronounced as in trees of other varieties and carries a partial effect. In the variant with manual thinning we recorded an average weight (170.3 g), which has balanced values throughout the research.

The products used in the chemical thinning of fruit also influenced the index in the study by recording different average weights of a fruit depending on the active substance used.

Comparing the average weight of a fruit according to the growth regulators used in chemical thinning, it was found that treating the trees with Geramid New 1.2 l/ha resulted in a value of 158.5 g, i.e. a decrease compared to the manual thinning variant by 6.9%. In the Geramid New 1.5 l/ha variant, the index studied increased to 180.5 g and in the 2.0 l/ha dose to 197.9 g. The increase in mean fruit weight correlated with the number of fruits obtained per tree on the variants studied.

When using Dirager and Gerba 4 LG growth regulators in chemical thinning, the average weight of a fruit at different treatment rates shows an higher increase compared to the Geramid New treated variants. Thus, if the average weight of a fruit in the last Dirager 0.2 l/ha variant was 172.4 g, then in trees treated with the 0.3 l/ha dose, the index in the study increased and amounted to 197.1 g. Higher values were obtained in the Dirager 0.4 l/ha variant (212.1 g).

The growth regulator Gerba 4 LG had a more visible action on the average weight of a fruit and recorded lower values in the variant with the 2.0 l/ha dose (194.1 g), then in ascending order the 2.5 l/ha dose (218.9 g) was placed and the fruits with higher mass were recorded in the variant with the 3.0 l/ha dose (229.3 g).

Fruit yield is the main index by which the effectiveness of the technological elements applied in apple cultivation can be assessed.

Fruit yield in apple trees is a complex characteristic that has a bearing on the method of management fruit load, how much product was applied at thinning and how these technological elements interacted with environmental factors.

The data in Table 3 show that the above-mentioned factors had an impact on fruit production in a tree.

The fruit production of a tree depends on the number of fruits in the crown and the average weight of a fruit. Higher fruit production in trees with different methods of fruit load management was obtained in 2016 compared to 2014 and 2015. In 2017, this index recorded lower values due to the above-mentioned factors.

The method of reducing of the fruit load during the research influenced the studied index, recording higher values in the Geramid New 1.2 l/ha variant with 20.58 kg/tree, then decreasing was the control variant, without thinning (19.75 kg/pom). If in the previous variant the gap during the research on fruit production was not big enough, then in the control variant we register lower values of the given indicator in 2015 and 2017 as in the case of the number of fruits.

An approximate value with the control variant, without thinning, was recorded for the Dirager variant 0.2 l/ha (19.6 kg/tree). The manual thinning variant recorded yields on a par with the Dirager 0.2 l/ha variant, constituting 19.11 kg/pom and 19.46 kg/tree respectively. The multi-year average yield per tree was recorded in the Geramid New 1.5 l/ha growth regulator treatment - 19.27 kg/tree and Gerba 4 LG 2.0 l/ha - 18.87 kg/tree.

Fruit yield per tree in the other variants was lower compared to the previous variants.

The fruit production in the crown of the trees was also influenced by the dose of product applied during the period of chemical thinning.

In Idared trees, higher fruit yields were obtained in the crowns of the variants treated with the growth regulator Geramid New at the doses of 1.2 l/ha (19.27 kg/tree) and 1.5 l/ha (20.58 kg/tree), which were higher or approximately the same as those obtained in the variant with manual thinning. Increasing the dose of product administered to 2.0 l/ha, decreased the fruit yield in the trees compared to the previous variants by 15.7 and 10.0%, respectively.

Within the variants treated with the Dirager growth regulator, fruit yield within a tree in the 0.2 l/ha treated variant where the index taken in the study recorded higher values compared to the Dirager 0.3 l/ha and 0.4 l/ha variants, by 7.3 and 15.2%, respectively.

Treatments with Gerba 4 LG regulator reduced fruit yield in trees more than Geramid New and Dirager. The yield of Idared trees ranged from 13.80 to 18.87 kg/tree. The value of this index for Gerba 4 LG 2.0 l/ha was higher than for Gerba 4 LG 2.5 l/ha and amounted to 18.87 compared to 16.06 kg/tree, i.e. an increase of

4.9%. In the case of Gerba 4 LG 3.0 l/ha the yield per tree was the lowest (13.80 kg), i.e. a 26.9% decrease in the index in the study.

Fruit yield per unit area did not differ much from that obtained from one tree because the number of trees in the variants studied was identical.

Averaged over the fruiting years, the highest fruit production was obtained in 2016 (45.2 t/ha), then decreasing in 2014 (43.23 t/ha), 2015 (42.92 t/ha) and lower values of this index were recorded in 2017 (40.09 t/ha).

The method of reducing of fruit load influenced differently on fruit production per unit area. Thus, if on average in the fruiting years (2014-2017) in trees of Idared variety in the variant Geramid New 1.2 l/ha fruit production amounted to 49.36 t/ha, in the control variant, without thinning, the value of the studied index was 47.03 t/ha. Theoretically, it would persist the hypothesis that the fruit yield would be higher in the variant without thinning, but based on the studies we record diametrically opposite results, which is explained by alternate fruiting of trees of the given variety in 2015-2017.

Table 4. Influence of growth regulators and treatment dose on fruit production in the crown of Idared apple trees, kg/tree

Variants of the experiment	Treatment dose (l/ha)	Years				Average 2014-2017
		2014	2015	2016	2017	
Without thinning (control)	-	21,82	16,50	24,64	16,06	19,75
Hand thinning	-	19.00	19.10	19.43	18.92	19.11
Geramid New	1.2	20.14	21.17	21.18	19.83	20.58
	1.5	19.17	19.83	21.00	17.09	19.27
	2.0	18.40	17.35	17.57	16.10	17.35
Dirager	0.2	19.56	19.31	19.63	19.36	19.46
	0.3	18.81	17.80	19.35	16.41	18.09
	0.4	16.08	16.56	16.97	16.44	16.51
Gerba 4 LG	2.0	18.66	19.23	20.18	17.41	18.87
	2.5	15.68	16.47	16.61	15.50	16.06
	3.0	12.44	15.05	15.87	11.84	13.80
Average	-	18.16	18.03	19.31	16.81	-

Identical values of the index taken in the study with the manual thinning variant (45.5 t/ha) were recorded in the chemical thinning variants treated with Geramid New at 1.5 l/ha (45.88 t/ha), Dirager 0.2 l/ha (46.50 t/ha) and Gerba 4 LG (44.92 t/ha). In the other variants this index was much lower compared to the manual thinning variant. The treatment dose for chemical thinning in the growth regulators taken in the study had a direct influence on the fruit yield calculated per unit area. So, for example, the fruit yield in case of treating trees with the growth regulator Geramid New 1.2 l/ha was 49.36 t/ha, then the value of this index in case of the variant Geramid New 1.5 l/ha was 45.88 t/ha. With increasing treatment rate, the value of the index in the study decreases and in the case of Geramid New 2.0 l/ha it was 41.32 t/ha (Table 5).

If, in the case of the variants treated with the growth regulator Geramid New, the yield was 41.32-49.36 t/ha, then the Dirager product had a stronger reducing effect on the fruiting organs in the Idared apple plantation, constituting 39.31-46.50 t/ha. Higher fruit yields per unit area were recorded in the Dirager 0.2 l/ha (46.50 t/ha) variant, then in decreasing position the Dirager 0.3 l/ha (43.05 t/ha) variant, the last position going to the Dirager 0.4 l/ha (39.3 t/ha) (Table 5) variant, where the degree of thinning was quite increased. The influence of the Dirager growth regulator, i.e. when the central fruit reached 8-9 mm in diameter, had such a clear influence on the index under study. Treating Idared trees when the central fruit reaches 10-12 mm in diameter will reduce the negative influence on fruit production per unit area.

The Gerba 4 LG product influenced the fruit yield on the studied variants, recording the lowest values of the index taken in the study. So, the average fruit production in the years 2014-2017 for Idared trees in the variant Gerba 4 LG in the dose of 2.0 l/ha was 44.92 t/ha, then the value of this index in the variant Gerba 4 LG in the dose of 2.5 l/ha was 35.74 t/ha, or a decrease by 20.4% compared to the previous variant. The above-mentioned logic is also valid for the variant treated with the growth regulator Gerba 4 LG at the dose of 3.0 l/ha where the fruit yield per unit area decreased by 26.9% compared to the variant Gerba 4 LG 2.0 l/ha and by 8.1% compared to the variant Gerba 4 LG 2.5 l/ha (Table 5).

Table 5. Influence of growth regulators and treatment dose on fruit yield in Idared apple orchard, t/ha

Variants of the experiment	Treatment dose (l/ha)	Years				Average 2014-2017
		2014	2015	2016	2017	
Without thinning (control)	-	51.95	39.28	58.66	38.23	47.03
Hand thinning	-	45.24	45.47	46.26	45.04	45.50
Geramid New	1.2	47.95	50.40	51.90	47.21	49.36
	1.5	45.64	47.21	50.00	40.69	45.88
	2.0	43.80	41.31	41.83	38.33	41.32
Dirager	0.2	46.57	45.98	46.73	46.73	46.50
	0.3	44.78	42.28	46.07	39.07	43.05
	0.4	38.28	39.42	40.40	39.14	39.31
Gerba 4 LG	2.0	44.42	45.78	48.04	41.45	44.92
	2.5	37.33	39.21	29.54	36.90	35.74
	3.0	29.61	35.83	37.78	28.19	32.85
Average	-	43.23	42.92	45.20	40.09	-

The higher temperature of 25ºC during 4-5 days after treatment in the daytime period influenced the degree of reproductive organ thinning in Idared, which is considered to be an easily thinned variety.

The analysis of the experimental data allows us to highlight that the highest production at chemical thinning of the reproductive organs was recorded in the Geramid New variant at the doses of 1.2 and 1.5 l/ha, in the case of the Dirager product variant at the dose of 0.2 l/ha and at the application of the growth regulator Gerba 4 LG in the variant treated with 2.0 l/ha.

The quality of the fruit is a particularly important feature when high yields are recorded per unit area and is characterized by various morphological, organoleptic, technological, biochemical, and finally food value characteristics.

Analysing the fruit diameter, which is a criterion for classifying the fruit into categories during the research and the variants taken in the study (Table 6), we can see that the index taken in the study is influenced by the method of reducing the fruit load, the products used for chemical thinning and the dose administered per unit area.

Lower values of fruit diameter during 2014-2017 in the investigated variants were in the year with higher yields, i.e. in 2016, constituting 77.6 mm.

The highest average fruit diameter was obtained in the year 2017 (81.8 mm), while in the years 2014 and 2015 the studied index recorded average values, constituted 78.5 and 79.9 mm, respectively. These average values over the years of study highlight a large diameter of fruit, which in the end may have a more restricted access to consumers due to the large weight and more difficult preservation in the post-harvest period.

The method of reducing the fruit load also influences the average diameter of a fruit. Lower values of the given index are recorded in the control variant without thinning (72.8 mm) and the variant treated with the growth regulator Geramid New 1.2 l/ha (72.7 mm). Studying how this index developed during the years of research, a more rational correlation of the average diameter of a fruit was scored in the variant Geramid New 1.2 l/ha compared to the control (without thinning). In the control variant due to the large gap per year of fruit production, the index under study was directly influenced. In years with high production (2015; 2017) we record a small average fruit diameter (59.1; 64.3 mm), and vice versa, in years with low production per unit area we record high values, the index under study constituting 81.3 and 86.6 mm, respectively.

The variants treated with Geramid New at the 1.5 l/ha dose was slightly higher (77.2 mm) than the value recorded in the control variant (75.8 mm). The treatment with Dirager at the 0.2 l/ha rate recorded identical values (75.9 mm) to the control variant. The growth regulator Gerba 4 LG which is characterized by a higher degree of thinning of the reproductive organs induced an increase in the index in the study.

Table 6. Influence of growth regulators and treatment dose on quality expressed as mean fruit diameter in Idared, mm

Variants of the experiment	Treatment dose (l/ha)	Years				Average 2014-2017
		2014	2015	2016	2017	
Without thinning (control)	-	64.3	81.3	59.1	86.6	72.8
Hand thinning	-	76.5	75.8	74.5	76.5	75.8
Geramid New	1.2	72.8	71.4	70.7	75.9	72.7
	1.5	77.1	74.7	76.2	80.7	77.2
	20	78.9	80.7	85.7	84.4	82.4
Dirager	0.2	76.8	77.2	71.8	77.7	75.9
	0.3	77.9	78.3	77.2	82.8	79.0
	0.4	86.2	85.7	85.3	82.1	84.8
Gerba 4 LG	2.0	78.2	77.9	78.4	79.0	78.4
	2.5	87.3	87.8	87.5	86.2	87.2
	3.0	88.0	87.7	87.2	88.1	87.8
Average	-	78.5	79.9	77.6	81.8	-

The average diameter of a fruit also changes under the influence of the dose of product applied per unit area. In the variants where growth regulators were studied, we record, that increasing the treatment dose increases the average diameter of a fruit. If, for example, in the variant Geramid New 1.2 l/ha the average diameter of a fruit was 72.5 mm, then with increasing the treatment dose to 1.5 l/ha it was 77.2 mm, and in the variant Geramid New 2.0 l/ha - 82.4 mm. The legality mentioned before is also valid for the growth regulators Dirager and Gerba 4 LG, except that the values taken in the study were higher than in the previous variant, constituting 75.9; 79.0; 84.8 mm and 78.4; 87.2 and 87.8 mm, respectively.

In general, we record that the number of fruits per tree, the average fruit weight, the fruit yield per tree and per unit area, and the average diameter of a fruit correlates with the method of reducing the fruit load, the fruit regulator used for thinning the reproductive organs and the dose applied, as well as the weather conditions during the treatment period and the following 4-5 days.

CONCLUSIONS

Growth regulators based on NAD, ANA and BA in various doses influence differently the number of fruits, their average weight, fruit diameter and the yield.

For a more effective reduction of the fruit load in Idared by chemical method and to exclude the influence of climatic phenomenon it is necessary to have 1-2 growth regulators to be used depending on the respective phenotype.

For the Idared variety higher yields and higher quality were recorded when treating with Geramid New at the rate of 1.2 l/ha at the fall of approx. 80% of flower petals plus 2-3 days. If the weather conditions are not favourable for Geramid New treatment during this period, the growth regulator Dirager can be applied later at a dose of 0.2 l/ha, when the size of the central fruit in diameter will be 8-9 mm. In exceptional cases, when the number of reproductive organs in the crown of the trees is large, should be used Gerba 4 LG at a dose of 2.0 l/ha, when the size of the central fruit in diameter will be 10-12 mm.

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