# RESEARECH CONCERNING THE USE OF THE FOLIAR BIOFERTILISERS BIONAT PLUS AND BIONEX IN GARDEN STRAWBERRY

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***Abstract**: Garden strawberry was cultivated in the spring of 2009 with fortified runners; it was a multiannual classical culture in the field of the Red Gauntlet variety, which matures in late May, a variety with good resistance to common leaf spot (Mycosphaerella fragariae), powdery mildew (Sphaerotheca macularis) and grey mould (Botrytis cinerea). The biofertilisers we used, Bionat plus and Bionex, were applied as two treatments together with recommended pesticides. The variety we used, Red Gauntlet, is an English variety suited for both field culture and greenhouse culture. The plant is medium vigorous, and it has a guided port. It was commercialised starting with 1957. The plant develops a suitable number of long runners. The variety is resistant to drought, frost and main diseases, particularly powdery mildew. It is among the best-yielding garden strawberry varieties – over 25 t/ha. The leaves are large, green and shiny, with rounded, curled median foliole. The fruit have resistant peduncles, which makes them difficult to detach from the plant. The fruit weigh 10-12 g, are short, conical, sometimes broadened and ribbed and with a slightly blunt tip. They are dark red with a rosy pulp. The achenes are small and superficially fixed in the pulp. The pulp is consistent, acidic-sweet, enough flavoured, and enough succulent. The inflorescence is hermaphroditic and it contains, on the average, 7 flowers. The petals are white and have the same length as the sepals.*

***Key words:** strawberry, treatment, variety pesticides, effectiveness*

## INTRODUCTION

The biofertilizations used Bionat Plus and Bionex were applicated to two treatments with recomandated pesticides, in two treatments: the first was the full infusion, and the second was to the showing inflorescence. The results reduced the attack frequency on the leaves with white spot (*Mycosphaerella fragariae)* in the first variant where applicated biofertilizations Bionat Plus and Bionex. The superior effectiveness was get in the first variant treated with Bionat Plus conc 0,2% and Bionex conc. 0,2%towards the second variant treated with Bionex conc. 0,2%. The treatment were applicated two times using the pesticides Dithane, conc. 0,2% in second variant to each treatment (T1, T2) whwre were good results by reducing the attack frequency caused bygrey rot and flouring.

## MATERIAL AND METHOD

Red Gauntlet variety, which matures in late May, a variety with good resistance to common leaf spot (*Mycosphaerella fragariae*), powdery mildew (*Sphaerotheca macularis*) and grey mould (*Botrytis cinerea*).

Land preparation for cultivation consisted in fertilisation with complex NPK fertilisers using a rate of 700 kg /ha on a plot area of 0.05 ha. Maintenance works were applied in accordance with the cultivation technology recommended in this crop.

Fruit harvesting was done every 2-3 days, during the ripening period, when the fruit pulp was still firm, and the fruit were 90% red in colour.

The biofertilisers we used, Bionat Plus and Bionex, were applied as two treatments together with recommended pesticides, as follows:

$T_1$ – upon full leaf appearance – April 21, 2011;

$T_2$ – upon inflorescence appearance (white bud) – May 2, 2011.

The frequency of fruit attacked was calculated with the formula:

$$F\% = \frac{nx100}{N}$$

where:

F = is the frequency of the attack by the pathogen and by the pest (%);

n = the number of fruit attacked;

N = the number of fruit observed.

## RESULTS AND DISCUSSIONS

***Results in common leaf spot (Mycosphaerella fragariae) control in garden strawberry leaves***

As far as the attack by diseases, particularly the attack by common leaf spot (*Mycosphaerella fragariae*), our observations carried out upon blooming are shown in Table 1.

*Table 1.*

Results in common leaf spot (*Mycosphaerella fragariae*) control in garden strawberry leaves

| ***Variant*** | ***Pesticides used*** | ***Concentration %*** | ***Frequency of attacks by Mycosphaerella fragariae*** |
|---|---|---|---|
| $V_1$ | $T_1$ – Systhane 12.5 CE | 0.05 | 7.3 |
| | Fastac 10 CE | 0.01 | |
| | Bionat Plus | 0.20 | |
| | $T_2$ – Systhane 12.5 CE | 0.05 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_2$ | $T_1$ – Systhane 12.5 CE | 0.05 | 11.7 |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| | $T_2$ – Systhane 12.5 CE | 0.05 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_3$ Control | $T_1$ – Systhane 12.5 CE | 0.05 | 13.1 |
| | Fastac 10 CE | 0.01 | |
| | $T_2$ – Systhane 12.5 CE | 0.05 | |
| | Fastac 10 CE | 0.01 | |

Data presented show that the best efficacy was in the variant $V_1$ when attack by *Mycosphaerella fragariae* was only 7.3%, compared to 11.7% in the variant $V_2$ and to 13.1% in the variant $V_3$.

***Results in grey mould (Botrytis cinerea) control in garden strawberry leaves***

Data presented in Table 2 show that the frequency of leaves attacked by *Botrytis cinerea* and grey mould decreased in the variants treated with pesticides and biofertilisers up to 2.3-5.7% compared to 8.3% in the control in which we used only pesticides.

*Table 2*

Results in grey mould (*Botrytis cinerea*) control in garden strawberry leaves

| ***Variant*** | ***Pesticides used*** | ***Concentration %*** | ***Frequency of attacks by Botrytis cinerea*** |
|---|---|---|---|
| $V_1$ | $T_1$ – Systhane 12.5 CE | 0.05 | 2.3 |
| | Fastac 10 CE | 0.01 | |
| | Bionat Plus | 0.20 | |
| | $T_2$ – Systhane 12.5 CE | 0.05 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_2$ | $T_1$ – Dithane M-45 | 0.20 | s5.7 |
| | Fastac 10 CE | 0.01 | |
| | Bionat Plus | 0.20 | |
| | $T_2$ – Dithane M-45 | 0.20 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_3$ Control | $T_1$ – Systhane 12.5 CE | 0.05 | 8.3 |
| | Fastac 10 CE | 0.01 | |
| | $T_2$ – Dithane M-45 | 0.20 | |
| | Fastac 10 CE | 0.01 | |

The best results were in the variant $V_1$ in which we used the fungicides Systhane 12.5 CE – 0.05% (upon 1st treatment) and the biofertiliser Bionat Plus 0.2% and in the 2nd treatment we used the same pesticides plus the biofertiliser Bionex 0.2%.

There were good results in the 2nd variant, where we used as fungicide only Dithane M-45 – 0.2% in both treatments.

***Results in powdery mildew (Sphaerotheca macularis) control in garden strawberry leaves***

*Table 3.*

Results in powdery mildew (*Sphaerotheca macularis*) control in garden strawberry leaves

| ***Variant*** | ***Pesticides used*** | ***Concentration %*** | ***Frequency of attacks by Sphaerotheca macularis*** |
|---|---|---|---|
| $V_1$ | $T_1$ – Systhane 12.5 CE | 0.05 | 3.7 |
| | Fastac 10 CE | 0.01 | |
| | Bionat Plus | 0.20 | |
| | $T_2$ – Systhane 12.5 CE | 0.05 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_2$ | $T_1$ – Dithane M-45 | 0.20 | 5.1 |
| | Fastac 10 CE | 0.01 | |
| | Bionat Plus | 0.20 | |
| | $T_2$ – Dithane M-45 | 0.20 | |
| | Fastac 10 CE | 0.01 | |
| | Bionex | 0.20 | |
| $V_3$ Control | $T_1$ – Systhane 12.5 CE | 0.05 | 5.3 |
| | Fastac 10 CE | 0.01 | |
| | $T_2$ – Dithane M-45 | 0.20 | |
| | Fastac 10 CE | 0.01 | |

Data presented in Table 3 show that the frequency of leaves attacked by powdery mildew (*Sphaerotheca macularis*) decreased in the variants treated with pesticides and fertilisers from 3.7 to 5.3% determined in the control in which we used only pesticides.

The best results were in variant $V_1$ in which we used both the fungicide Systhane 12.5 CE – 0.05% (1st treatment) and the biofertiliser Bionat Plus 0.2% while in the 2nd treatment we used the same pesticides and the biofertiliser Bionex 0.2%, with a frequency of the attack by powdery mildew of 3.7%.

There were good results in the variant $V_2$ also, where we used only the fungicide Dithane M-45 – 0.2% in both treatments, with a frequency of the attack by powdery mildew of 5.1%.

***Production Results***

Production results in the garden strawberry variety Red Gauntlet after application of biofertilisers and pesticides are shown in Table 4.

*Table 4.*

Production results in the garden strawberry variety Red Gauntlet in 2011 at the Farm nr. 3 Lugoj S.D.E. Timişoara

| *Variant* | *Treatment* | *Pesticides and biofertilisers* | *Concentration %* | *Yield per 0.05 ha* | *Mean yield kg /ha* |
|---|---|---|---|---|---|
| $V_1$ | $T_1$ | Systhane 12.5 CE | 0.05 | 360 | 7200 |
| | | Fastac 10 CE | 0.01 | | |
| | | Bionat Plus | 0.20 | | |
| | $T_2$ | Systhane 12.5 CE | 0.05 | | |
| | | Fastac 10 CE | 0.01 | | |
| | | Bionex | 0.20 | | |
| $V_2$ | $T_1$ | Systhane 12.5 CE | 0.05 | 335 | 6700 |
| | | Fastac 10 CE | 0.01 | | |
| | | Bionex | 0.20 | | |
| | $T_2$ | Systhane 12.5 CE | 0.05 | | |
| | | Fastac 10 CE | 0.01 | | |
| | | Bionex | 0.20 | | |
| $V_3$ Mt. | $T_1$ | Systhane 12.5 CE | 0.05 | 325 | 6500 |
| | | Fastac 10 CE | 0.01 | | |
| | $T_2$ | Systhane 12.5 CE | 0.05 | | |
| | | Fastac 10 CE | 0.01 | | |

Data presented in Table 4 show that the best production results in garden strawberry were in variant $V_1$ in which, together with the pesticides applied in the 1st treatment we used Bionat Plus – 0.2% and in the 2nd treatment we used Bionex – 0.2%, with a mean production of 7200 kg /ha in the garden strawberry variety Red Gauntlet.

In the variant $V_2$, where we used as foliar fertiliser together with pesticides only Bionex – 0.2%, mean yield was 6700 kg/ha, while in the variant $V_3$, where we used only pesticides, mean yield was 6500 kg /ha.

Observations carried out showed longer runners in the variant treated only with Bionex and thickening of the runners in the variant treated with Bionat Plus upon 1st treatment and Bionex upon 2nd treatment.

## CONCLUSIONS

The best production results and decrease of the attack by common leaf spot (*Mycosphaerella fragariae*) in garden strawberry were in the variant in which we used phyto-sanitary treatments until blooming consisting of pesticides and foliar biofertilisers Bionat –

0.2% in the 1st treatment in the full leafage phenophase and Bionex – 0.2% in the 2nd treatment in the white bud phenophase (appearance of inflorescences).

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