

Integrated Apple Trees Management For The Control Of Fire Blight In Albania

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ABSTRACT : Fire blight is a bacterial disease that destroys a part or all plant crown. It has a fast diffusion and a high cost of control for its limiting. During this study followed for the year 2012 in an apple orchard with natural infection by disease, were tested fungicides such as: biological preparation, Serenade (*Bacillus subtilis* a.i.), Aliette (Phosetyl Aluminium a.i.) and copper-based preparations compared with the variant where are used treatments by the farmer (as evidence). Time of chemical treatments application consisted of the variants with the activation of pathogen (*Erwinia amylovora*) during blossom and then was followed by mechanical cleaning of shoots or infected branches. From experimental results that were obtained during infection assessments before each treatment and that final (end of July) resulted that : the use of *Bacillus subtilis* reached a limitation of crown infection up to 10% compared with other variants, where the infection was respectively 20% and 30% while the witness by the farmer 50%. Use of biological fungicide, *Bacillus subtilis*, especially during blossom apple, appeared promising in the fire blight management program of pome fruits.

Key words: Fire blight, management, biological preparation.

I. INTRODUCTION

Fire blight caused by bacterial pathogen *Erwinia amylovora* (Burrill) Winsolow et al, is the main disease, the most serious and complex to manage in pome fruits. *E.amylovora* is known as a pathogen of Rosaceae and has a wide host range within that family. Van der Zwet and Keil (1979) summarized a diversity of reports about fire blight inducing symptoms on 200 species in 40 rosaceous genera. Fire blight damages host plants, by drying flowers, leaves and shoots and by creating cancerous wounds in the bark of the branches of the tree as a result of which trees get dried. (Pace, H.2005). Attempts to limit fire blight must be made during begin of host plant development and especially in the sensitive stage of blossom. Regarding chemical protection, antibiotics have a temporary effect due to the birth of resistant strains. The copper-based preparations , phosetyl aluminium and biological preparations (*Bacillus subtilis*) have a relative limitation effect. Integrated management of the disease dictates the use of clean planting material, monitoring the occurrence of the disease in orchards, mechanical removal of the organs affected and the use of fungicides with the effect of limiting, especially after hail or severe weather events resulting in the wounding of shoots. Using preparations with different active substances is intended to put to test their effect in limiting the fire blight during the booming and the infection of shoots and other parts of the crown on the affected plant.

II. MATERIAL AND METHODS

The study was conducted during year 2012 in an apple orchard in manufacturing with Gala varieties aged 8 years, where is present a natural infection of fire blight. To conduct the study was set up an experimental field with four variants in four repetitions. This variants represent chemical treatment programs with fungicides as in scheme.

Variant I

Treatments during blooming with *Bacillus subtilis*. Treatments starting with activation of primary inoculum (Determined by the method of forecasting Maryblyt) and continues every 10 days until the fruit settings.

After the fruit settings continues mechanical elimination of shoots, branches and treatments with copper fungicide every 10 - 12 days.

Variant II

With the beginning of the disease infection treatments with Aliette flash (phosetyl aluminium) were made every 10 - 12 days.

After the fruit settings becomes elimination of wounds with cutting and treatments with copper fungicide every 10 - 12 days.

Variant III

Bud - fruit settings without treatment.

After fruit settings becomes elimination of wounds with cutting and treatments with copper fungicide every 10 - 12 days.

Option IV

Fungicides used by the farmer:

At blooming time : Captan, Carbendazin every 10 days.

Increasing of fruit size : Dodine, thiofanate methyl every 10 days.

The level of disease development intensity is expressed as a percentage of the affected area in the crown of the plant from level 9 which is the lowest till level 1 which is the highest (by Zeller 1974).

Presentation of the level of infection by *Erwinia amylovora* in the crown of affected trees.

Method of touching levels by Zeller (1974) from level 9 which is the lowest till level 1 which is the highest.

9 – there is no infection

8 – 10% of crown is affected

7 – 20% of crown is affected

6 – 30% of crown is affected

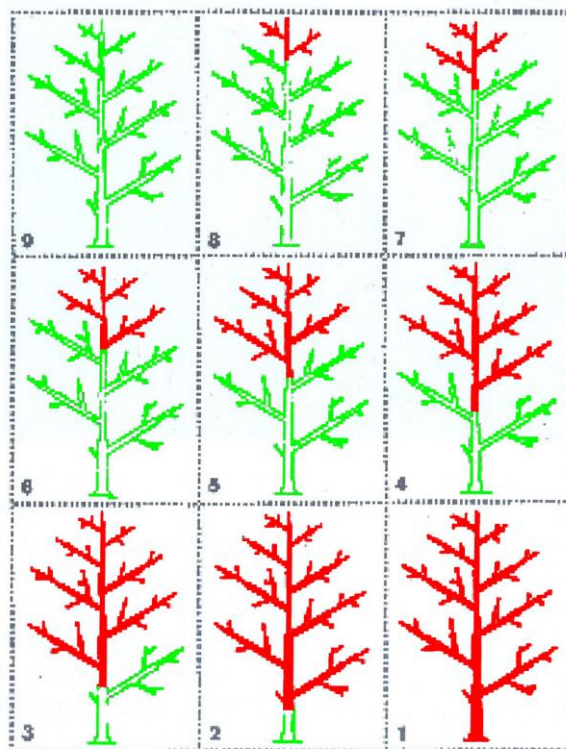
5 – 40% of crown is affected

4 – 50% of crown is affected

3 – 80% of crown is affected

2 – 90% of crown is affected

1 – 100% of crown is affected



Assessment of disease infection was performed in all variants before the next treatment and final assessment is made at the end of July.

For the calculation of touch intensity from the fire blight disease is used Mekinei’s formula.

$$I = \frac{\sum (n \times v)}{N \times 9} \times 100$$

I = Tactile intensity in %

Σ = sum

n = evaluated number of trees in each stage

v = 0,1, ... 9 number of evaluation steps

N = total number of trees taken in the preview

Based on assessment of infection levels for each variants , was determined the level of disease limitation affected by applied programs in relevant variants.

III. Monitoring phenological phases of apple

Phenological development of apple plants in experimental field was followed through periodic surveys every 7-10 days , mainly for the following phases : siviler tip, green tip, pink, bloom, petal fall, post bloom (increasing of fruit size).

Performing chemical treatments

Treatments in the order and the study programs were implemented using the pump back with normal volume of solution.

IV. RESULTS AND DISCUSSION

Orchards where is pursuing research is in the area of Ndroq on the outskirts of Tirana and has natural fire blight infection. Orchard is made up of apples cv Gala aged 8 years. Treatment became with activation of primary inoculum and continues until the end of July.

Phenological stages of development

| Cultivar | Silver tip | Green tip | Pink | Bloom | Petal fall | Post Bloom (increasing of fruit size) | Remarks |
|----------|------------|------------|------------|------------|------------|---------------------------------------|--------------------------------|
| Gala | 16.03.2012 | 26.03.2012 | 02.04.2012 | 07.04.2012 | 15.04.2012 | 18.04.2012 | Early and susceptible cultivar |

Inoculum which was ready for infection appeared during blooming at date 07.04.2012.

Preparations used in treatment:

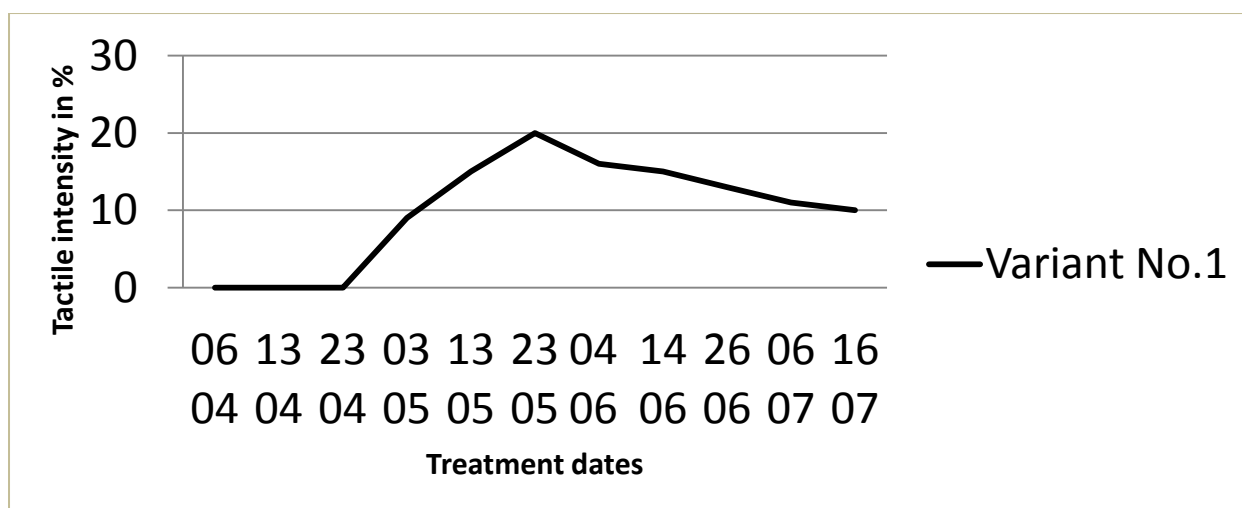
- Serenade (Bacillus subtilis) 713 with concentration 0.2% – 0.3%
- Aliette 80% a.i. (fosetyl Aluminium) with concentration 0.25%
- Neoram (50% copper oxychloride) with concentration 0.20% - 0.25%
- Captan with concentration 0.25%
- Carbendazim with concentration 0.06% - 0.08%
- Dodine with concentration 0.09% - 0.1%
- Thiophanate methyl with concentration 0.05% - 0.06%

Implementation dates of treatment, according to the programs

For the fourth variants are those dates:
 06.04.2012,16.04.2012,23.04.2012,03.05.2012,13.05.2012,23.05.2012,04.06.2012,14.06.2012,26.06.2012,06.07.2012,16.07.2012,14.03.2012,24.04.2012,04.04.2012,14.04.2012,20.04.2012,23.04.2012,03.05.2012,13.05.2012,23.05.2012,04.06.2012,14.06.2012,16.07.2012

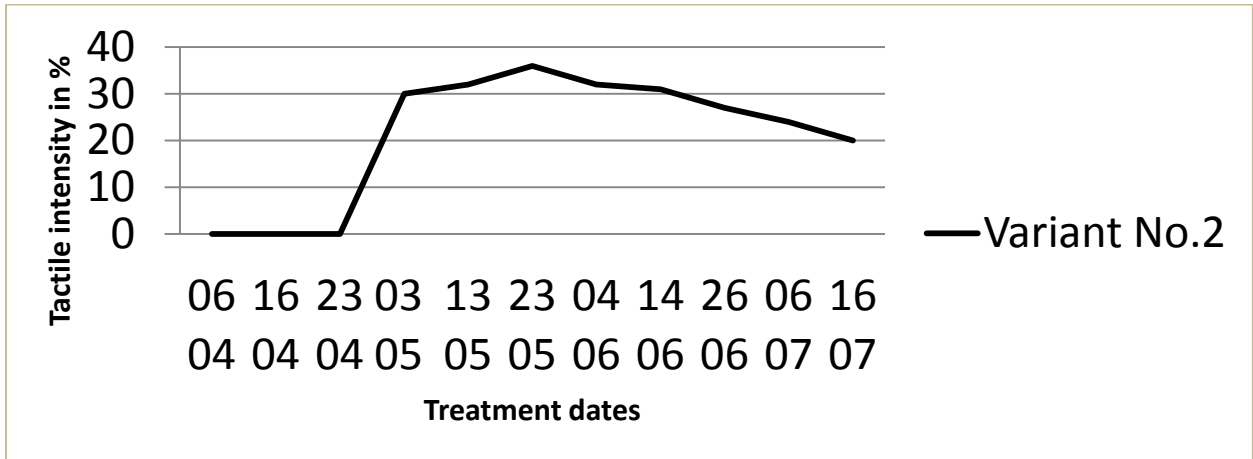
Below is shown intensity level of the disease through graphs.

Graphic No.1 : The tactile intensity of the disease in % for the first variant.

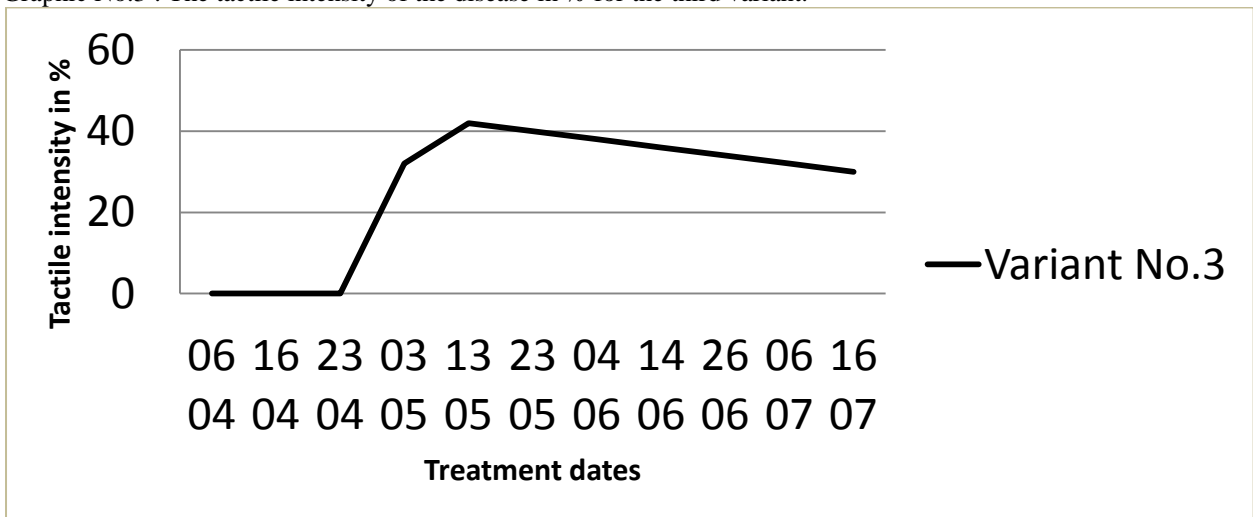


Infection started on 23.04.2012, is grown to 20% and has come decreasing to 10%.

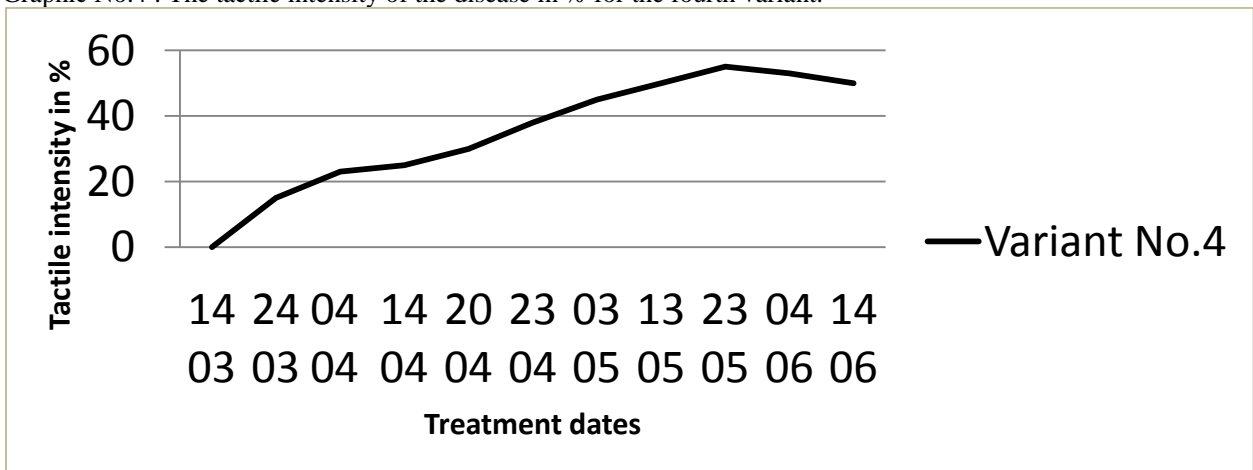
Graphic No.2 : The tactile intensity of the disease in % for the second variant.



Infection is grows to 36% on the date 23.05.2012 and then it has come decreasing to 20%.
 Graphic No.3 : The tactile intensity of the disease in % for the third variant.



Disease infection was increased up to 42% and comes decreasing to 30%.
 Graphic No.4 : The tactile intensity of the disease in % for the fourth variant.



Treatments from the farmer had started from date 14.03.2012 and have continued up to date 14.06.2012 and at date 16.07.2012 has become final assessment.
 Infection increased up to 55% and then it has come decreasing to 50%.

V. CONCLUSION

The use of the Maryblyt forecasting system which is based on weather data processing, has helped to specify the time of use of preparations at the moment when disease touches the of flowers , shoots and branches.

Blooming period is held as the most critical in terms of the plant sensitivity to infection, as well as inoculum distribution. (Hasani, M. Pathology of fruit trees)

Programs followed by variants gave encouraging results which provided an opportunity that together with mechanical cleaning of shoots, branches and other infected parts could lead gradually to limit the devastating effects of the disease.

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