

STRATEGY FOR BACTERIAL PHYTOPATHOGENS SPREAD DECREASE IN FRUIT ORCHARDS

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Summary. A lot of natural and anthropogenic factors impacts on fruit crops and measure complex for spread decreasing bacterial phytopathogens in orchards observed in this article.

Keywords: pome fruits, bacterioses, plant pathology.

Introduction

The effective and adequate protection gardens from pests, e. g. bacterial diseases for supporting stable yield and receiving high quality goods. The causative agent of pome fruits fire blight (*Erwinia amylovora* (Burrill) Winslow et al) and bacterial bark necrosis (*Pseudomonas syringae* van Hall). These pathogens are able to cause defeating for all kinds of fruit trees *Rosaceae*. Apple-tree and pear-tree belong to such important cultivars [1-4].

The plantation's bacteriosis intensity development does not depend upon the varietal composition. It also depends upon the climatic conditions on pathogen's surviving and disease development caused by them, the insects-carriers spread, agrotechnique level from which depends general phytosanitary plantations state, following phytosanitary security requirements during executing works for trees and protection managing and means usage against pests. It is possible to receive more high efficiency considering all factors impact bacteriosis spread and development. It also allows to decrease pesticide load on environment through exact determining terms of treating [3-7].

So this papers purpose was to determine pome trees' bacteriosis sources in garden's of Western region of Ukraine and their pattern study under different factors spread impact through their development and spread under different factors (agrotechnical measures, weather conditions, different insect-carriers presence, resistance level/plant sensitive etc.) for the following development measures for their spread decreasing.

Material and methods

Phytosanitary researches for pome trees bacteriosis sources determining and factors study. They depend upon their development and spread in Chernivtsi district Chernivtsi region area in households of different property during growing period of pome trees (pear tree, apple-trees< quince) with following observing for diseases in determined sources. We considered their varietal content of plantations, trees age and their common state (e. g. presence of mechanical damages, frost damages etc.; pests dwelling), it may serve as bacteriosis carriers of causative agents. We have also extracted samples for laboratory researches, described and make photo defeating symptoms. Terms for researches conduction determined as per phenological phases coming and periods of the highest trees sensitive to bacterial phytopathogens defeating [3,7].

The general approved techniques used for laboratory researches for morphocultural, physiological and biochemical and bacterium pathogen abilities for diagnostics of bacterial phytopathogens. They include colonies morphology study on different nutrient and diagnostic mediums: microscopy of bacterial cells in viable state and on fixing and dying preparations, study of nutrient medium feeding and creation exchange products by different color reactions, pathogen's determining through artificial defeating sensitive plants in laboratory terms [8-11].

Results and discussions

The first symptoms of bacteriosis damage were noted at the beginning of the growing season in the form of ulcers on the bark of skeletal branches and buds death during deployment at the researches conducting. Then the bloom drying happened on branches with damaged bark. Main symptoms observed in May and June beginning. The disease development inhibits with dry terms coming. It stopped with temperature increase to 27-30°C. The young leaves drying observed on defeated trees. They became brown color on apple-tree and almost black. in pear. The bark defeating had the appearance of ulcers, clearly separated from healthy tissue or cracks with a detachment of the upper part of it. It dried up, acquiring a brick or light brown color. Among the freshest ulcers was a liquid with a sour smell, which is considered one of the signs of bacterial necrosis. The same defeating were observed on windproof trees lines (wild cherries, cherries), which can serve as reservoirs for infection.

As a result, shoot damage by bacterial necrosis in average did not exceed 5-7% of the crown volume, damage to the bark of trunks and skeletal branches reached 20% in mechanical damage or freezing suffered trees. There were any signs of fire blight damage on fruit trees in the plantings of Chernivtsi region, and the causative agent of this disease was not detected in the samples selected for laboratory analysis during 2021-2024. Bacterial isolates separated from defeated plant material were identified with the causative agent with a complex of morphological, cultural and physiological features. Among them was identified bark necrosis causative agent *Pseudomonas syringae* van Hall. Saprophytic species were also found in the researched samples. Among them were *Pantoea agglomerans* and *Pseudomonas fluorescens*. They can show the antagonistic against bacterial phytopathogens, inhibiting their reproduction.

Pear, apple and quince trees were damaged by various pests – flower eaters insects during flowering (various types of flower chafers), later aphids and also codling moth. The most spread species were: psyllid and green apple aphid among insects -pests. They may serve as bacterial pathogen carriers. Apple aphids populate the top of apple-trees plantations during their intensive growth.

Trees are the most favorable to fire blight. The pear psyllid spreads happened at the same time on the pear-trees. It makes conditions not only for bacterium penetration in trees tissues. It may cause to photosynthesis intensity through the leaf surface contamination, because soot dew settles on insect secretions. Insufficient nutrients synthesis affects not only the yield, but also leads to a decrease in winter resistance. Winter bark damage, by the way, contributes to damage by bacterial phytopathogens (especially bacterial bark blight) in the next growing season, creating a gateway for infection penetration. Cycle repeating "damage by adverse weather conditions – infection with bacteriosis" for several years can lead to the complete death of trees.

In addition to insect population, significant mechanical damages on shoots and bark of branches during long-term growth and trunks was observed in the surveyed plantings, especially in the case of using large-sized equipment for processing row spacing and when mowing grass in trunk strips. Bark blight provided serious damages of apple-trees trunks lower parts for this reason. The causative agent penetrated through cutting places in the plant. So in the plot of farmer-household "Boiany-Glynnnytsia" in 2022 were determined dried trees. They dried in result of bark drying in circle form on trunk's lower part. It caused the malfunction of conducting system. In addition to bacterial blight. The damage creates prerequisites for fungal phytopathogens penetration through ulcers. Especially, cytosporosis development was observed, as well as the formation of polypores' fruit bodies on trees with bacterial blight. Damage also creates during the agrotechnical works by the possibility of spreading the causative agent of bacterial blight, especially in plantings where wild pear used as a rootstock, since its root growth can serve as a reserve of infection.

So the struggle strategy with these diseases should be complex and do not include only protection from chemical protection measures. It may account a great number of natural and anthropogenic factors impact on spread and development fruit crops bacteriosis. It recommends regular inspection of pome fruit crops plantings providing (pear, quince, apple-trees) and adjacent windproof strips for in-time determining disease sources. The lines includes wild species of the

family *Rosaceae* inspects too. The bacteriosis development can occur without pronounced symptoms, and therefore such plants can be reserves of infection for a long time. The observations should be carried out during periods when plants are most sensitive to infection with bacteriosis, especially, during flowering and fruit setting and during intensive shoots growing. It is also advisable to inspect trees in case of damage due to squalls, hail and heavy rains with wind gusts, since this way bacterial pathogens are transferred and conditions are created for their penetration into the plant organism.

Maintaining fruit plantations in proper condition will prevent the bacteriosis development and reduce their losses. In particular, it is necessary to use insecticides against insects that can be carriers of bacteriosis pathogens, primarily aphids and psyllids, which are considered the main distributors of the causative agent of bacterial blight. It is better not to allow the crown thickening, and during gardens start-up to observe the norms of tree placement, since shading contributes to the survival of bacteria in exudate droplets (under the sunlight influence, the pathogen dies), and the interweaving of branches causes their damage, which contributes to the pathogens penetration. It is necessary to control the correctness of fertilizer application and foliar top dressing, since excess nitrogen causes excessive growth of green shoots, which are most susceptible to bacterial blights, and also significantly reduces the winter resistance of plants, which are more affected by diseases, especially bacterial necrosis of the bark. It is also best to avoid excessive pruning of branches, as this also leads to increased growth of shoots and, accordingly, a stronger bacterial burn lesion. It is necessary to disinfect the tool for prevention the disease causative agent carrying during pruning and other garden work conduction. It recommends to use the copper-containing preparations for prevention the bacterial disease and in the identified case in plantations.

It is necessary to use high-quality planting material with mandatory verification for the absence of pathogens of bacterial diseases for new industrial fruit plantations and nurseries of ornamental *Rosaceae*. It is also necessary to account the presence of mature fruit plantations during the new intensive gardens laying. The pathogen micro-flora may accumulated in it (with observation lack for the plot observed caused by the plot's owners changes). So it is necessary to provide measures for their improve the phytosanitary state of plantings. Among them are: to clear the trunks and crown of lichen, dead bark, dried and affected by polypore fungi branches with mandatory disinfection and treatment of wounds, whitewashing the trunks and skeletal branches with lime solution by adding copper sulfate, thinning thickened crowns for better access to air and sunlight, apply means to kill weeds in row spacing, since they can retain phytopathogenic bacteria in epiphytic state. It also recommends to destroy the root growth, which is the main reserve of bacterial burn infection and bacterial blight (necrosis) o bark. It is necessary to pay attention to plantings with pear seedlings as rootstocks. They create the big number of shoots sensitive to bacterioses defeating. It is necessary to save the reliable phytosanitary terms of adjacent windproof strips for avoiding the bacterioses infection sources, where grows plants of family *Rosaceae* (wild pear, apple, pome trees and various types of hawthorn).

Conclusions

The main factor for bacterial blight causative agent spread in Chernivtsi region plantings is a bark damage by the observations results for seasonal disease and pest development. These damages were caused by the careless processing of row spaces and the adverse weather conditions in winter period (freezing and warming of bark). So the pear psyllids observed among the private households. They may be carriers for bacterioses causative agents. Fire blight is among them. Therefore, the contraction strategy for the bacterial pathogens spread in fruit agrocenoses should be based upon the harmful insects control, resistant varieties selection to adverse weather conditions and compliance with the proper level of garden care measures.

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