

MAYHAW PRODUCTION

THE MAYHAW TREE IS THE OFFICIAL STATE FRUIT TREE IN LOUISIANA.

It belongs to the family *Rosaceae* and is considered native to the southeastern United States. Mayhaw blooms in February and March (Figure 1), and the fruit is commonly used to make jellies (Figure 2). In Louisiana, the gross farm value for mayhaw decreased to \$880,161 in 2020 as compared to \$1.25 million in 2019. Mayhaw was cultivated on 191 acres statewide in 2020, down from 239 acres in 2019.

The total mayhaw fruit production significantly decreased to 588,752 pounds in 2018 as compared to 972,579 pounds in 2017. Louisiana's hot and humid weather provides conducive environmental conditions for development and spread of fire blight (Figure 3) and quince rust (Figure 4), two major diseases of mayhaw. These diseases are best managed by implementing an integrated approach, including fire blight resistant varieties, good cultural and sanitation practices, and judicious use of fungicides.

Currently, the active ingredient aluminum tris is labeled for managing fire blight on nonfruit bearing trees. Mono- and dipotassium salts of phosphorus acid is labeled for managing fire blight on both bearing and nonbearing fruit trees. Four fungicides labeled for quince rust only provide variable disease suppression. These diseases present a major challenge in mayhaw production. A preliminary disease survey conducted in mayhaw orchards located in Jackson, Louisiana, during May to October in 2019, revealed that the fire blight incidence varied from 40%-80% on Spectacular and Royal Star cultivars of mayhaw, respectively. The quince rust severity varied from 5%-20% per tree. Therefore, an effective and economical disease management program was critically required to improve mayhaw production.



Figure 1. A mayhaw tree blooms during spring.



Figure 2. Ripened mayhaw berries are used for making jams and jellies.

A two-year field study was conducted to determine the efficacy of Cueva (copper octanoate) and Double Nickle (*Bacillus amyloliquefaciens* strain D747) for managing fire blight and quince rust development on mayhaw. Three orchards, including two cultivated orchards (A and B) and one noncultivated orchard (C) located in Jackson, Louisiana, were used in this study. Disease severity data was collected and analyzed to determine the success of the spray programs.

Mayhaw trees in cultivated orchards A and B were pruned in January of 2021 and 2022. Copper hydroxide (Kocide 3000) was applied to all trees in cultivated orchards A and B in mid-January during both years. Additionally, Rally 40WSP (myclobutanil) was applied to all trees in cultivated orchards A and B at three different intervals starting in mid-February through late March during both years. Three applications of Cueva (copper octanoate) and Double Nickle (*Bacillus amyloliquefaciens* strain D747) were made in cultivated orchards A and B starting mid-February through late March during both 2021 and 2022. The number of trees receiving various treatments in each orchard are shown in Table 1. All trees in noncultivated orchard C were not pruned and neither received any of the above said treatments.



Figure 4. A mayhaw berry exhibits orange pustules infected with quince rust disease.



Figure 3. This mayhaw tree branch terminal exhibits typical symptoms of shepherd's hook caused by fire blight disease.

Data on disease severity was collected weekly during both years. Data was collected visually on four sides of each tree. A total of 40 (10 on each side) branch terminals were randomly scored for fire blight symptoms. Similarly, 40 berries (10 on each side of a tree) were randomly scored for quince rust development. Percent disease severity data was calculated and analyzed to determine the success of using Cueva and Double Nickle on the top of the standard disease treatments of pruning, Kocide and Rally. Data was compared to the nontreated control trees (trees that did not receive any Cueva or Double Nickle treatments) in cultivated orchards A and B and noncultivated orchard C.

Table 1. The number of randomly selected trees in each orchard that received various treatments.

	Orchard A (Treated/Total trees)	Orchard B (Treated/Total trees)	Orchard C (Treated/Total trees)
Pruning	60/60	48/48	0/75
Kocide 3000	60/60	48/48	0/75
Rally 40WSP	13/60	16/48	0/75
Rally 40WSP+Cueva	23/60	13/48	0/75
Rally 40WSP+Double Nickle	23/60	19/48	0/75

RESULTS

Year 2021

Fire blight disease severity between orchard A and B were not significantly different. Therefore, data was combined from cultivated orchards A and B and compared to the noncultivated orchard C (Figure 5). The average percentage disease severity in orchard A on Cueva treated trees was 34%, whereas the disease severity of 29% was observed on trees treated with Double Nickle. The untreated control trees in orchard A had a disease severity of 37%. Trees in orchard B that received Cueva had an average fire blight severity of 42%. Disease severity of Double Nickle sprayed trees averaged 32%. The untreated control trees fire blight disease severity averaged 38%. The noncultivated orchard C had 54% fire blight severity which was significantly higher than cultivated orchards A and B.

2021 Fire Blight Severity

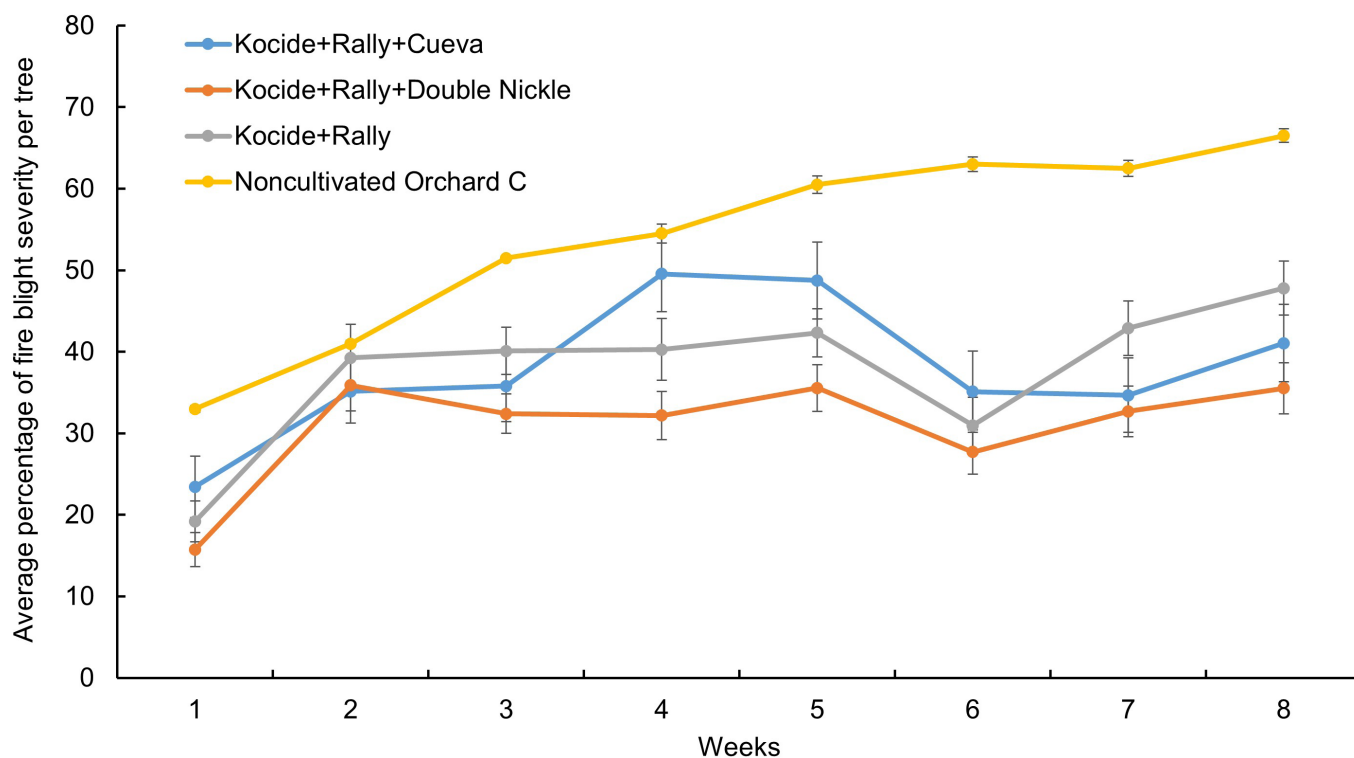


Figure 5. A line graph representing average percentage of fire blight severity on mayhaw trees during the 2021 growing season.

Quince rust was significantly low in cultivated orchards A and B compared to noncultivated orchard C in 2021. The disease was delayed by two weeks on trees that received Cueva in both A and B orchards compared to Double Nickle and nontreated control trees. The disease pressure was high from week one until the harvest of the berries in noncultivated orchard C. The disease severity remained below 15% in cultivated orchards A and B regardless of the treatments. The results show that fungicide Rally was effective in managing quince rust during 2021.

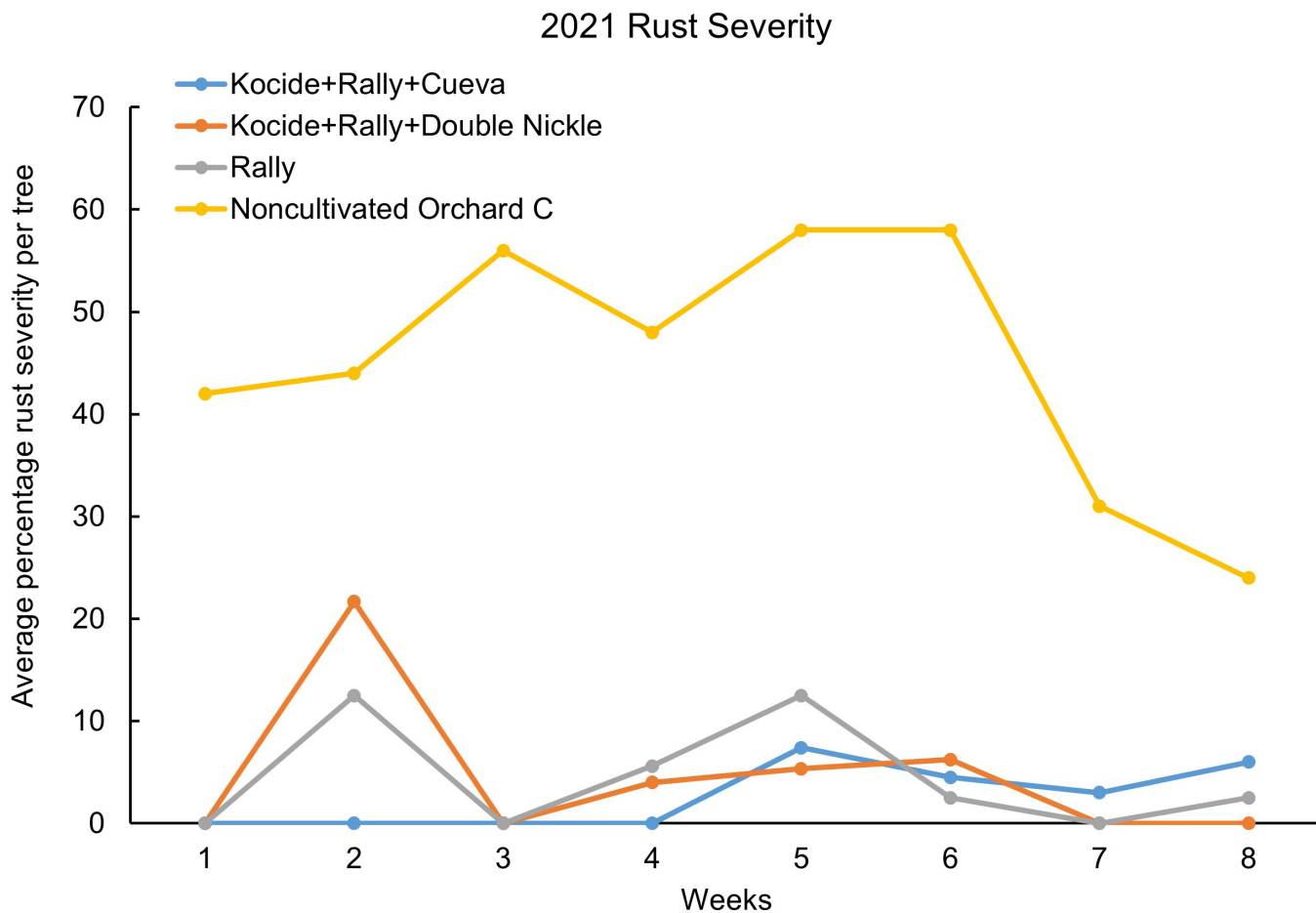


Figure 6. A line graph representing average percentage of rust severity on mayhaw trees during the 2021 growing season.

Year 2022

There was no significant difference observed in fire blight severity among trees that received Cueva and Double Nickle in both A and B cultivated orchards. Additionally, fire blight severity was not significantly different between treated trees and nontreated control trees. No significant difference in disease severity was observed between noncultivated orchard C and treated cultivated orchards A and B. Trees treated with Cueva and Double Nickle had an average fire blight severity of 0.05% and 0.04%, respectively. Combined disease severity on nontreated control trees in orchards A and B averaged 0.06%. Noncultivated orchard C had an average disease severity of 0.02%.

During 2022, **quince rust** was not detected in any of the three orchards during the growing season. An average quince rust severity of less than 0.01% was observed during the last week of scouting in noncultivated orchard C.

Conclusion

Disease severity results from 2021 showed that pruning combined with fungicide sprays reduced both fire blight and quince rust in cultivated orchards A and B compared to noncultivated orchard C. A preliminary scouting of cultivated orchards A and B in 2019, revealed 11%-71% of fire blight severity. Pruned trees in cultivated orchards A and B had less disease in the beginning which may have resulted from removal of surviving bacterial inoculum in the infected branch terminals. Some studies in the past have shown that mechanical pruning may lead to disease spread, and therefore it is critical to apply a copper-based fungicide to pruned trees. Fire blight in cultivated orchards A and B remained below 50% as compared to 65% in noncultivated orchard C (Figure 5). Although, trees treated with Double Nickle had less fire blight, it was not significantly different from Cueva and nontreated control trees in cultivated orchards A and B. This could have resulted from the chemical spray drift due to proximity of these trees. All trees in cultivated orchards A and B received three applications of Rally resulting in significantly lower quince rust infection of 0%-20% as compared to noncultivated orchard C with 30%-60% infection (Figure 6).

Disease severity data from 2022 was inconclusive. Fire blight severity remained less than 0.15% in all orchards and no treatment effect was observed. The low disease infection might have resulted from low primary inoculum combined with environmental conditions. This interpretation is supported by the fact that during 2022, quince rust was not detected in any of the three orchards during the growing season. The disease was only detected below 0.01% during last week of scouting in noncultivated orchard C. Fire blight and quince rust severity data from 2021 showed that the combination of pruning along with use of chemical sprays may effectively manage these diseases. Further research on pruning and spray timing may aid mayhaw growers in managing these diseases below economic injury level which may lead to reduced yield losses.

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