PPQ 2024 Annual Report

Optimizing Pest Management: Specialty Crop Pests

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Introduction

The goal of the Specialty Crop Pests (SCP) Program is to protect U.S. fruits and vegetables, tree nuts, horticulture, and nursery crops from adverse impacts associated with invasive pests, such as crop damage or threats to international trade and interstate commerce. The U.S. Department of Agriculture's (USDA) Plant Protection and Quarantine (PPQ) program works with State, Tribal, university, and industry partners to develop and implement practices, policies, and regulations that prevent or mitigate impacts for invasive pests of Federal regulatory significance. These activities include verifying pest distribution, identifying and mitigating risk pathways to prevent long distance spread of the pests, developing and implementing diagnostic tools and pest mitigation strategies, and communicating with the public to gain support for program strategies.

These efforts help U.S. farmers export their products, prevent damage to specialty crop production (helping to ensure the availability of fresh fruits and vegetables), and protect natural resources, including forests and residential landscapes. The program currently addresses numerous pests and diseases, including exotic fruit flies, a variety of citrus pests and diseases, the glassy-winged sharpshooter (GWSS), spotted lanternfly (SLF), pale cyst nematode, navel orangeworm (NOW), and *Phytopthora ramorum*, among others.

Overall, the program directly protects specialty crop production worth more than $12.7 billion in 2023 (USDA Animal and Plant Health Inspection Service [APHIS] internal analysis based on National Agricultural Statistics Survey data). The program indirectly protects additional specialty crop production valued at $7.7 billion in 2023, by preventing the spread of these damaging pests and diseases to new areas (based on APHIS internal analysis based on National Agricultural Statistics Service data).

Without the SCP program, trading partners might not accept a variety of U.S. fruits and vegetables. The value of trade in specialty crops that could potentially be disrupted without the SCP program was $3.8 billion in 2023, according to an internal APHIS report using data from the USDA Foreign Agricultural Service's Global Agricultural Trade System.

Grape Pests

The SCP program targets several devastating pests and diseases, including European grapevine moth (EGVM), GWSS, and SLF, that could affect grape production and impact export markets.

European Grapevine Moth (EGVM)

In August 2016, PPQ declared the successful eradication of EGVM from California. However, PPQ, in collaboration with the California Department of Food and Agriculture (CDFA), county departments of agriculture, and industry partners continue to monitor for EGVM. In fiscal year (FY) 2024, we placed more than 22,000 traps in 37 participating counties, using a multi-lure trap that targets four grape pests in addition to EGVM, and surveyors monitored California grape-growing areas for SLF. No infestations were found.

Glassy-Winged Sharpshooter (GWSS)

PPQ also continued the successful, cooperative GWSS program designed to suppress populations of this pest where it is established. GWSS is a vector for Pierce's disease, which is lethal to grapevines. The program's suppression and regulatory activities work to prevent the spread of the vector and disease across California. In FY 2024, the program continued to conduct surveys and other regulatory activities, including inspections of nursery stock and bulk citrus for the pest in 49 California counties, and

continued area-wide suppression activities in affected agricultural production areas of four California counties.

With citrus growers' voluntary suppression treatments, the program covered over 20,000 acres. Of the more than 27,000 shipments of nursery stock from infested areas, California county inspectors rejected 2 shipments due to GWSS life stages being present. Together, the EGVM and GWSS programs directly protected 820,000 acres of grape production worth $6.8 billion in California in 2023 (National Agricultural Statistics Survey Noncitrus Fruit and Nuts 2023 Summary).

Spotted Lanternfly (SLF)

In FY 2024, PPQ and cooperators continued addressing SLF through Specialty Crop Pest funding, as well as $13.9 million in funding made available under Plant Protection Act Section 7721. This invasive pest is now found in 17 States, including Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Virginia, and West Virginia. The insect sucks sap from stems and leaves, causing damage to plants as they feed. When the spotted lanternfly feeds, it excretes a sticky, sugary fluid that causes sooty mold, which can further damage plants. SLF prefers to feed on the "tree of heaven" (*Ailanthus altissima*), a rapidly growing deciduous tree native to China that has become a widespread invasive species across North America. However, SLF also feeds on a wide range of crops and plants, including grapes, apples, hops, walnuts, and hardwood trees. Thus far, vineyards have been the most adversely affected agricultural commodity.

There is a strong correlation between new SLF populations and major transportation pathways, such as railroads and interstate corridors. PPQ conducts targeted treatments and, in some areas, removes SLF's preferred host plant, tree of heaven, from transportation hubs with the aim of reducing the risk of SLF spread to new areas. PPQ and cooperators also continue to conduct treatments in high-risk sites of the infestation and to eradicate isolated infestations. In FY 2024, the program continued using golden spray oil—an environmentally friendly control option that allows year-round control—to treat SLF egg masses to combat the pest, and expanded its use to include early instar nymphs, providing more options to reduce populations around high-risk areas. In FY 2024, PPQ and cooperators treated 4,892 properties covering 5,847 acres in affected areas included in the program's environmental assessment (EA). PPQ and cooperators surveyed more than 30,000 acres and deployed more than 7,000 traps nationwide. In April 2024, the program published a programmatic, nationwide EA to address all known and potential SLF treatment areas in the United States, allowing PPQ and cooperators to implement treatments expeditiously when infestations are detected in new areas.

In FY 2024, PPQ continued developing new methods to control SLF, including potential biological control organisms, such as a fungal pathogen that targets the tree of heaven and a parasitoid that targets SLF nymphs, and additional treatments for egg masses. PPQ will continue to evaluate the biological control agents and develop methods to rear them on a larger scale in the laboratory should they prove to be effective and specific to their targets. PPQ also developed a process to prioritize methods development needs for SLF as outlined in the program's strategic plan.

Citrus Diseases and Asian Citrus Psyllid

PPQ supports the citrus industry's continued ability to produce, harvest, process, and ship citrus fruits and nursery stock despite the presence of diseases such as citrus canker, citrus greening or Huanglongbing (HLB), sweet orange scab, and citrus black spot, which decrease fruit quality, increase production costs for producers, and threaten export markets for fruit from affected areas.

HLB is the most serious disease of citrus currently impacting Florida and Texas, and threatening the citrus crop in Arizona, California, and Louisiana, and most recently, Mississippi, where it was detected in a residential area. The insect vector, the Asian citrus psyllid (ACP), spreads the disease. Through the Citrus Health Response Program, PPQ and State partners also conduct surveys for other diseases not known to occur in the United States, including citrus leprosis virus and citrus variegated chlorosis.

PPQ and cooperators in citrus-producing States perform multi-pest surveys providing timely information about the presence of pests and diseases to growers and State government partners. This information allows growers to take necessary actions to manage their groves and allows PPQ and States to update quarantine boundaries and regulations to prevent the spread of serious citrus pests and diseases through the movement of regulated materials.

In FY 2024, PPQ updated quarantine boundaries for HLB, ACP, sweet orange scab, citrus blackspot, and citrus canker due to detections outside existing quarantine areas or to align with State quarantine boundaries. In areas affected by citrus pests and diseases, PPQ's flexible regulatory protocols have minimized the impact of the quarantines on growers, who can move citrus out of quarantined areas to packinghouses if they follow mitigation procedures to prevent the disease or its insect vector from spreading. PPQ works with citrus nurseries across the United States to ensure that nursery stock produced in areas quarantined for citrus diseases is free from the pests, ensuring that clean plants are moving between States and available for citrus producers and residential use.

In FY 2024, PPQ worked with citrus nursery growers to evaluate changes to citrus nursery stock protocols that would meet disease prevention goals while adding flexibility for growers, such as adding new treatment options, adjusting treatment intervals, and allowing flexibility in scheduling inspections, among other things. In FY 2024, PPQ also developed a disaster preparedness plan for citrus nursery stock producers to mitigate the potential citrus pest and disease risks associated with damage to nurseries in the event of natural disasters such as hurricanes. For example, nurseries can protect tables of plants with individual screen covers that would allow those plants to maintain their status in the event that the screenhouse experiences a breach. Additionally, PPQ updated the citrus black spot Federal Order to remove unnecessary requirements for growers.

In FY 2024, approximately 580 businesses had compliance agreements with PPQ and moved regulated host materials such as citrus fruit and nursery stock under more than 5.6 million certificates and limited permits (includes items such as boxes of fruit and individual plants that growers under compliance agreement can certify on site). State partners managed an additional 1,800 compliance agreements to facilitate same movement of regulated host materials.

PPQ and cooperators continue extensive surveys that establish citrus black spot-free production units and low-prevalence areas for citrus canker in Florida for export packing to the European Union. PPQ also supports area-wide management efforts in Texas and California for citrus pests and diseases. In FY 2024, PPQ and cooperators continued to conduct risk-based surveys for HLB in residential and commercial citrus areas in California to ensure they detect the disease quickly if it is present. PPQ assists CDFA in aggressively responding to positive detections of HLB (thus far in residential areas only) and implementing an area-wide management approach for ACP population control.

PPQ continued biological control efforts targeting ACP. This program, which employs a predatory wasp against ACP, augments other management methods, especially in residential areas in Arizona, California, Louisiana, and Texas, where use of chemical pesticides is undesirable. PPQ and CDFA continued surveys for citrus yellow vein clearing virus in California and found a single detection in Los Angeles County, outside where it was first confirmed in Tulare County. For the 2023 – 2024 season, there were 532,500 bearing acres with production worth approximately $2.9 billion (National Agricultural Statistics Survey Citrus Fruits 2024 Summary). Without PPQ's activities, citrus exports could be at risk each year. The 2023 value of U.S. citrus exports totaled approximately $778 million (USDA Foreign Agricultural Service's Global Agricultural Trade System).

HLB Multi-Agency Coordination (MAC) Group

In December 2013, USDA implemented a unified emergency response framework, the HLB MAC group, to better position the Department to help address the citrus industry's immediate and long-term needs in dealing with this disease. In addition to APHIS, the MAC is comprised of representatives from USDA's Agricultural Research Service (ARS) and National Institute of Food and Agriculture (NIFA); U.S. Environmental Protection Agency; State departments of agriculture in Arizona, California, Florida, and Texas; and citrus industry organizations in California, Florida, and Texas. The HLB MAC Group helps to coordinate and prioritize federally funded research with industry's efforts to bridge the gap between research and implementation, reduce unnecessary duplication, and more quickly provide practical tools for citrus growers to use.

Between FY 2014 and 2019, the HLB MAC funded a total of 105 projects focused on strategies for vector control, therapies for infected trees, sustainability of new plantings, early detection technologies,

best management practices for citrus groves, and support for the development of HLB-resistant citrus varieties. In FY 2019, the HLB MAC shifted focus towards determining the best management practices for producing citrus under the threat and pressure of HLB. PPQ first supported the Florida Citrus Research and Field Trials (CRaFT) project to conduct field evaluations of strategies that showed previous scientific evidence of success and then initiated similar projects in California and Texas. These long-term projects evaluate interactions between methods, treatments, environments, rootstock/scion combinations, and growing practices in the different conditions in each State.

Florida's CRaFT program is treating more than 71,000 acres (11,000 of them supported with HLB MAC funds) of mature citrus trees with novel therapies as part of the field trials; in California, the program is supporting growers in adopting strategies to mitigate ACP presence in groves covering 4,800 acres to prevent HLB introductions; and in Texas, the program is evaluating strategies including different approaches to grove floor management and ACP management on 1,000 acres. In 2024, PPQ provided HLB MAC funds to Florida and Texas for ongoing CRaFT projects and provided funding to maintain the CRaFT dashboard and to rebuild the dashboard on a more efficient and cost-effective platform. PPQ also funded an additional project using the CRISPR gene editing technique for resistance to HLB for grapefruit.

Tree Fruit and Nursery Stock Pests

PPQ works with State and Tribal partners, universities, and industry to develop and carry out programs to protect tree fruit and nursery crops from damage and trade disruptions due to invasive pests. Through these activities, PPQ directly protects nursery stock production worth approximately $1.3 billion in 2019, (the most recent year that data is available), and tree fruit production worth approximately $2

billion in 2023 (APHIS internal analysis based on National Agricultural Statistics Survey data). By preventing pests and diseases like exotic fruit flies and *Phtophthora ramorum* from spreading to new areas, the program indirectly protects approximately $6.4 billion in fruit and nursery stock production (APHIS internal analysis based on National Agricultural Statistics Survey data).

Exotic Fruit Flies

PPQ takes the threat of exotic fruit fly outbreaks very seriously. These insects are among the most destructive, feared, and well-publicized pests of fruits and vegetables around the world. Working with State partners, we aim to detect an outbreak early and respond rapidly. Our swift and effective action protects crops and the industries that depend on them, as well as valuable foreign export markets.

PPQ protects a wide variety of specialty crops (particularly tree fruit and citrus) through exotic fruit fly exclusion and detection activities targeting Mediterranean fruit fly (Medfly), Mexican fruit fly (Mexfly), Oriental fruit fly, and other species. The program has reduced the number, and mitigated the effect of, Medfly and Mexfly incursions for many years by conducting preventive releases of sterile insects to disrupt normal population growth in at-risk areas, detecting and responding to outbreaks when they occur, and developing advanced methods for survey and control.

Medfly is one of the most destructive agricultural pests in the world, attacking more than 300 cultivated and wild fruits and vegetables. One of the Agency's key strategies is maintaining internationally recognized Medfly free areas in Petén, Guatemala, and in Belize (approximately 57,529 square miles combined), and managing pest populations in southern Mexico and neighboring areas of Guatemala to prevent northward movement of Medfly towards the United States through the international MOSCAMED program. The MOSCAMED program conducts surveillance with a 61,912-square-mile

fruit fly monitoring network across Guatemala, the Mexican State of Chiapas, and Belize to detect Medfly incursions in the managed areas and suppresses populations through sterile insect release and bait spray treatments.

The program treated 47,884 acres in Peten, Guatemala, and Belize, eradicating 159 wild Medfly detections to effectively maintain Medfly-free status. In FY 2024, the program also continued responding to high numbers of Medfly incursions in MOSCAMED-designated free areas of Mexico and Guatemala. The program produced a total of 53 billion sterile insects for use in the regional program and for release in California's and Florida's preventive programs. Using emergency funds transferred to APHIS in FY 2024, the program released an average of 320 million additional sterile Medflies per week in areas of Guatemala and Mexico experiencing outbreak levels of Medfly detections. Additionally, the program treated 491.5 million acres in Mexico and Guatemala to control populations and curb northward Medfly migration.

The MOSCAMED program maintained activities through a period of insecurity in the region, including country-wide protests and closures restricting movement and access in and across Guatemala in late 2023 after the country's Presidential elections. The program maintained access to 98 percent of the sites for traps and control activities, through strategic collaboration with rural communities and agricultural producers, complemented by a mass media campaign. The campaign generated 7 million views and boosted social media engagement by 28.5 percent, effectively promoting the safety and purpose of Medfly control activities.

Since 2015, when the first Medfly outbreak occurred in the Caribbean, PPQ has worked with partner countries in the region to improve surveillance for Medfly and other exotic fruit flies. In FY 2024, six

Caribbean countries participated in this effort with active trapping and surveillance programs. APHIS and MOSCAMED assisted the Dominican Republic response to a Medfly outbreak during FY 2024, providing 72 million sterile flies (funded through the Organismo Internacional Regional de Sanidad Agropecuaria).

Domestically, PPQ and State cooperators maintain the cooperative Preventative Release Program, which releases sterile fruit flies in high-risk areas to prevent any introduced Medflies or Mexflies from reproducing and establishing a population in the United States. In the Los Angeles area in California, PPQ and cooperators release 120 million sterile Medflies per week, and in 4 port areas in Florida, 80 million per week. To protect Texas and California from Mexfly incursions, PPQ releases sterile Mexflies in Texas and in the Tijuana and Reynosa areas of northern Mexico. In support, the MOSCAMED program provided 4.34 billion sterile pupae to Texas and 1.25 billion sterile pupae to the northern Mexico programs. PPQ and cooperators also maintain a detection network of more than 160,000 traps in California, Florida, New York, Puerto Rico, Texas, and other States vulnerable to exotic fruit fly incursions.

When outbreaks occur, PPQ and cooperators implement immediate emergency response activities to eradicate them. In 2024, the program faced an unprecedented number of domestic fruit fly outbreaks, including 8 outbreaks in California and 10 in Texas. Using emergency funds transferred from the Commodity Credit Corporation, PPQ and cooperators completed the eradication of seven outbreaks in California that were initially detected in 2023 or early in FY2024. PPQ also completed the eradication of five of the Mexfly outbreaks in Texas in FY 2024 and continues to address the remaining outbreaks. In FY 2024, APHIS continued releasing approximately 130 million sterile male Mexfly per week in the Lower Rio Grande Valley.

PPQ also continued to address the European cherry fruit fly (ECFF) in northwestern New York in FY 2024. PPQ and cooperators in New York enforce quarantine regulations over the 5,140 square-mile affected area to reduce the risk of human-assisted spread of ECFF to other cherry-producing areas. PPQ conducted surveillance along the border of the quarantine and detected ECFF in one area outside the current quarantined zone. PPQ is continuing to delimit the affected area and will expand the quarantine in FY 2025 to include the newly affected area.

Cherry producers can mitigate the damage the pest may cause to crops through current management practices. PPQ regulatory measures allow the movement of cherries out of the quarantine areas using float tests in the orchard and at the processing plants—when the cherries are submerged in water, fruit fly life stages float to the surface—to determine whether any ECFF are present in shipments. These float tests reduce trapping requirements for growers in their fields while meeting the goal of preventing ECFF from spreading through cherry shipments.

Navel Orangeworm (NOW)

PPQ and cooperators also work to address navel orangeworm. In FY 2024, PPQ and cooperators in California continued implementation of the NOW areawide program, targeting the moth, which is a serious pest of tree nut crops including almonds, pistachios, and walnuts. Adult moths lay eggs through gaps in the nut hulls or shells, where newly hatched larvae feed and contaminate the nuts with insect waste and secondary fungal spores that may produce poisonous aflatoxins.

PPQ uses its rearing facility in Phoenix, Arizona, to produce sterile NOW moths and ships them to California, where they are released by airplane over participating pistachio and almond orchards. In FY

2024, PPQ and cooperators at CDFA and the University of California Cooperative Extension (UC Riverside) continued work with participating orchards that maintain 2,560 acres for NOW release and 2,560 for non-release for comparison. PPQ produced and released approximately 750,000 sterile NOW moths per day over participating almond and pistachio orchards.

PPQ continued to provide a portion of the sterile NOW moths for research initiatives conducted by ARS and the UC Riverside. PPQ also worked with ARS to develop a protocol to assess NOW damage for pistachios, which previously only had a protocol for almonds. PPQ and cooperators continue to evaluate the impact of NOW sterile moth releases and the other integrated pest management measures in tree nut crops.

Phytophthora ramorum (P. ramorum)

PPQ protects natural resources and nursery stock production and trade by limiting the spread of *P. ramorum* from quarantine areas and affected nurseries through regulatory strategies and adoption of mitigations and changes to cultural practices. *P. ramorum*, which causes sudden oak death, can be moved through host nursery stock and can affect a variety of forest trees. The disease is present in coastal northern California (affecting 16 counties in the State) and a small area in Curry County, Oregon.

In FY 2024, Oregon State officials continued surveys related to a positive detection outside the quarantined area. PPQ will update quarantine regulations to include the new area when the delimiting surveys are completed. Because of the presence of *P. ramorum* in the surrounding environment, nurseries within the quarantine area that ship interstate must meet annual certification survey and sampling requirements to prevent the movement of potentially infested material.

The program also regulates nurseries outside the quarantine area that have been confirmed positive for *P. ramorum* in plants, water, or other regulated articles. The nurseries must remain free of *P. ramorum* for 3 consecutive years to be deregulated. All positive interstate shipping nurseries must participate in a compliance program using protocols to eliminate the pathogen and implement required mitigations focused on critical control points to reduce the risk of reintroduction. During FY 2024, 15 nurseries participated in the program. Three nurseries were added to the program, and PPQ released two nurseries which completed program requirements.

Through all the activities of the many programs described above, PPQ directly protects nursery stock production worth approximately $1.3 billion in 2019 (the most recent year that data is available), and tree fruit production worth more than $2 billion in 2023 (APHIS internal analysis based on National Agricultural Statistics Service data). By preventing pests and diseases like exotic fruit flies and *P. ramorum* from spreading to new areas, the program indirectly protects approximately $6.4 billion in fruit and nursery stock production (APHIS internal analysis based on National Agricultural Statistics Survey data).

Potatoes

PPQ addresses two major potato pests, pale cyst nematode (PCN) in Idaho and the golden nematode (GN) in New York that feed on the roots of high-value crops such as potatoes, tomatoes, and eggplants. If pest populations are left unchecked, they can reduce crop yields by 20 to 70 percent. PPQ and cooperators have confined each to a relatively small area and continue survey and regulatory efforts to protect potatoes that are grown in all 50 States and exported from 18 States. Together, these programs protected 960,000 acres of U.S. potatoes, valued at approximately $5.6 billion at 2023 (National

Agricultural Statistics Service). In 2023, the United States exported more than 579,000 metric tons ($339.3 million) of fresh and seed potatoes (USDA Foreign Agricultural Service's Global Agricultural Trade System).

Pale Cyst Nematode

PCN has not been detected outside of Idaho, and fumigations of infested fields in Idaho have reduced PCN populations by 99 percent since the pest was first detected in 2006. In FY 2024, PPQ processed 9,970 samples for the PCN eradication effort in Idaho and 7,450 samples for detection surveys in 6 other States. In FY 2024, the program conducted 1,625 regulatory treatments of farm equipment to prevent the spread of PCN out of regulated areas. There are currently 32 PCN-infested fields, and the current regulated area is 6,495 acres (down from 6,535 acres at the beginning of FY 2024), of which 3,538 acres are infested fields, and 2,957 acres are associated fields (those connected through use of shared farm equipment or other means of pest spread). The infested fields are in an 8.5-mile radius that spans a portion of northern Bingham County and southern Bonneville County.

In FY 2024, the program continued eradication treatments on 7 infested fields, totaling 754 acres. In the treated fields that no longer show PCN viability, according to a greenhouse bioassay test, producers can plant potatoes with continued monitoring by PPQ and cooperators to ensure PCN is not present. During the greenhouse bioassay (three rounds of greenhouse bioassay that is the equivalent of three crop cycles), the program tests the viability of any PCN nematodes found in the soil. If the nematodes are found to be non-viable (they fail to reproduce under favorable conditions in the presence of a host), the fields from which they came are eligible to immediately return to potato production at the landowners' discretion. The PCN program requires infested fields that return to potato production to undergo full-field surveys following each of three subsequent potato crops to check for viable PCN populations.

These fields remain regulated but benefit from reduced sanitation requirements. The fields will be sampled following harvest and analyzed for the presence of viable nematodes.

The program is working with ARS, the University of Idaho, and other cooperators to develop PCN-resistant potato varieties. PPQ has funded several projects on PCN-resistant potato varieties through Plant Protection Act 7721 for this long-term effort.

Golden Nematode

In FY 2024, PPQ and New York cooperators continued an effective survey and regulatory program targeting GN, with a focus on deregulation of all eligible land. Adopting strategies used in the more recently established PCN program, the GN program is focusing on fields that are either infested or associated with infested fields rather than political boundaries such as townships. PPQ, working closely with the New York State Department of Agriculture and Markets (NY AGM), has removed more than 1.2 million acres from the GN regulated area in New York since 2010, allowing several farmers to grow their crops without restrictions.

In FY 2024, PPQ worked with NY AGM on additional proposed reductions to the area regulated by the State following the completion of soil surveys consistent with PPQ regulations. Pending the successful completion of updates to New York's GN regulations, PPQ will publish a parallel quarantine to reduce the GN regulated area in New York in early FY 2025. PPQ continues to manage an active control and mitigation program to prevent GN from spreading from the remaining regulated acres in portions of eight New York counties, including 5,945 acres that are infested with GN.

The program enforces regulations designed to prevent the spread of GN and requires sanitation treatments of farm equipment and other items moving out of the quarantined area. In FY 2024, the program processed 2,362 soil samples for the GN deregulation effort in New York. The program conducted 435 regulatory treatments of farm and earthmoving equipment to prevent the spread of GN out of regulated areas and certified 9 shipments of potatoes to Canada, totaling 400,045 pounds. PPQ has cooperated with ARS, NY AGM, and Cornell University to develop GN-resistant potato varieties for several decades. The program has developed a total of 45 GN-resistant varieties. Because the pest can overcome resistance, continued development of new GN-resistant varieties is necessary.