Cal Poly Strawberry Disease Diagnostic Service

Summary of Diagnostic Service Activity 2022

Between January 1st and July 1st 2022, 73 strawberry sample submissions were received. Each submission typically consisted of 3-5 plant samples but was greater when new transplants, leaf, or fruit samples were submitted. Plant samples were tested using plating on selective media and molecular methods.

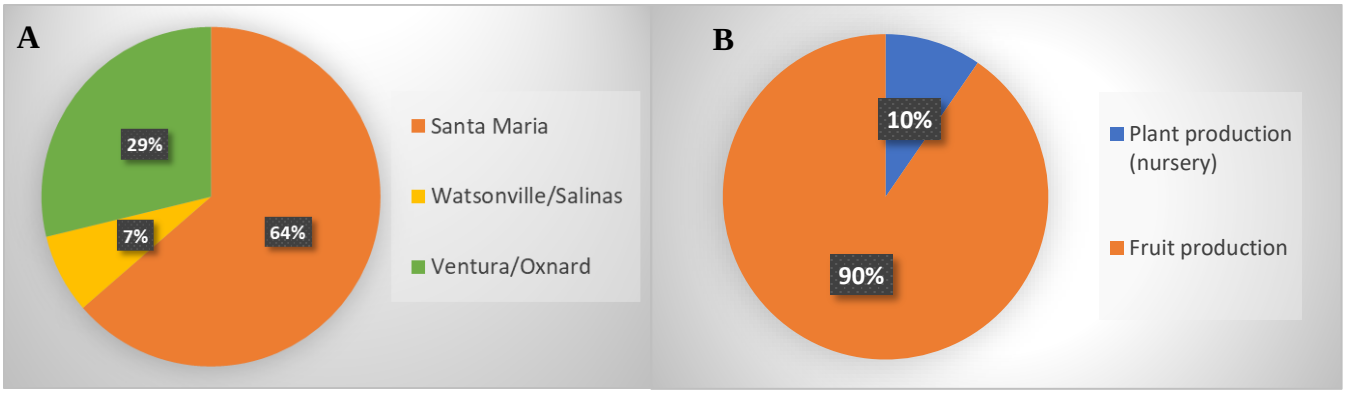

Figure 1. A) Diagnostic samples by district and **B)** by production type

Table 1. Comparison of disease identification up to July 2022 with past years

Disease/pest/disorder	Number of samples		
	2020 (Jan- Dec)	2021 (Jan-Dec)	2022 (Up to July 1)
Abiotic/pest problems	39	16	20
Macrophomina crown rot	37	25	14
Phytophthora crown rot	10	12	10
Fusarium wilt	31	11	12
Verticillium wilt	17	7	3
Zythia spp.	9	0	0
Rhizoctonia spp.	5	8	0
Ramularia spp.	NA	NA	1
Pythium spp.	NA	29	17
Meloidogyne spp.	NA	NA	3
*Beet pseudo-yellow virus	NA	NA	3
Herbicide damage	NA	NA	1
Total number of samples	**164**	**96**	**73**

*Diagnosed by CSP Labs, Pleasant Grove, CA.

Minor Pathogens and Abiotic Problems on Strawberry Health

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Background

Strawberry plant health can be challenged by both biotic (e.g., diseases) and abiotic (e.g., salinity) factors. Diagnosing which factors cause poor plant health can be complex. Both conventional and organic strawberry production in each growing district in California are challenged by soil-borne diseases. The main soil-borne pathogens of strawberry in California are *Verticillium dahliae*, *Phytophthora* spp., *Fusarium oxysporum* f. sp. *fragariae*, and *Macrophomina phaseolina*. In addition to these major pathogens, other pathogens have also been detected at Cal Poly Strawberry Center's disease diagnostic service. These include *Colletotrichum* spp. *Pythium* spp. (Fig. 1), *Rhizoctonia* spp., *Ilyonectria* spp., *Phomopsis* spp. and *Neopestalotiopsis* spp. Some of these pathogens have become major problems in other strawberry growing states. Some other pathogens occur as disease complexes such as black root rot (e.g., *Pythium* spp., *Rhizoctonia* spp., *Ilyonectria* spp). There are also submitted plant samples where none of these pathogens are detected.

Experiment

In this project we investigate the role of minor pathogens and abiotic factors on strawberry plant health. From the strawberry plants submitted to Cal Poly disease diagnostic service, samples where only minor pathogens or no pathogens were isolated were used in the study. Isolates obtained from the samples (e.g., *Pythium* spp.) are being studied for their pathogenicity using Koch's postulates (Fig. 2)

Figure 1. A) A diagnostic sample that was only positive for *Pythium* spp. and **B)** *Pythium* spp. isolated from roots on PARP media

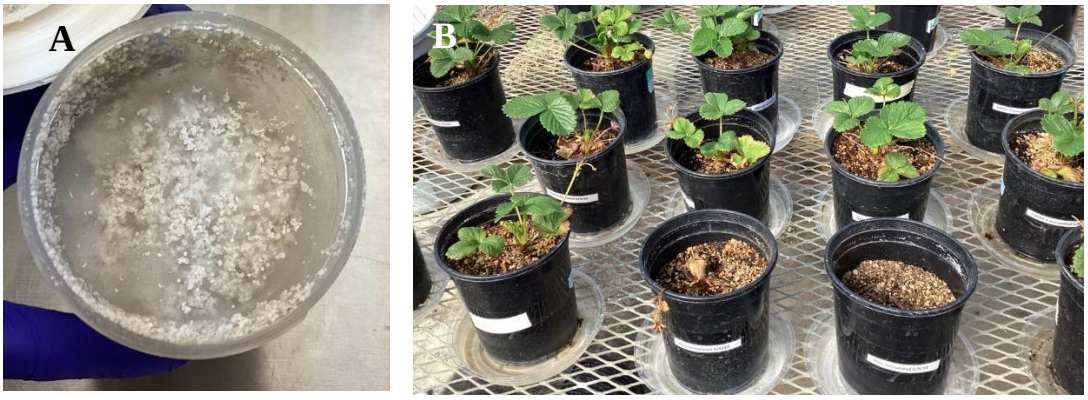

Figure 2. A) Cornmeal sand inoculum of a *Pythium* isolate; **B)** Koch postulate experiment to confirm pathogenicity of a *Pythium* spp. isolated from a grower sample.

Samples that were negative for any pathogens based on tissue plating were sent out to a lab to detect a panel of 11 viruses. Some of these samples were asymptomatic while in some others, leaves had turned purple to red in color (Fig. 3). Typically viruses require two or more co-infections to show symptoms.

Figure 3. A diagnostic sample positive for Beet pseudo-yellow virus

Soil from the root zone of samples that are negative for any pathogens are tested for salinity using a conductivity sensor. Strawberry is highly sensitive to salinity and it has a low threshold of 1.0 dS m^{-1} for the electrical conductivity of the soil saturation extract (ECe).