Optimized Lygus Bug Vacuum

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Introduction

Lygus bugs (Western Tarnished Plant bug) is a serious economic pest affecting California strawberry production. Feeding by all life stages of this insect cause fruit to become misshapen and unmarketable. There is widespread resistance in lygus to many registered insecticides. Registered insecticides are more effective on younger nymphs than on older nymphs or adults and have little or no efficacy on eggs. Bug vacuums are a mechanical control method used by California growers that remove adult, large and small nymphal stages of the insect from the strawberry canopy. Vacuuming has been shown to significantly reduce fruit damage, and when supplemented with traditional chemical controls, can help reduce the development of insecticide resistance.

Southern District: Oxnard & Santa Maria

- Typical bed size are 64 or 68-inch spacings
- The larger beds accommodate 4-plant rows each
- A typical tractor used by southern district growers has 90-100 HP
- Tractor wheels span a single bed
- The CSC automation team developed the Double Barrel Bug Vacuum for the 64” or 68” spacings
- Several growers have utilized literature published on the CSC & CPSC websites to fabricate the Double Barrel Bug Vacuum themselves
- The CSC also has a close relationship with C&N Tractors who is producing and selling the Double Barrel Bug Vacuum

Figure 1: A Lygus Bug on a leaf next to a green berry.

Figure 2: Conventional 3 row bug vacuum in Santa Maria.

Results and Discussion

- Field testing showed a 2.3x increase in efficacy over conventional bug vacuums
- More efficient and robust design
- 1 fan covers 2 plant lines as compared to the conventional’ s 1 fan per 4 plant lines
- Utilizes six 24-inch fans housed in corresponding 24-inch long cylindrical aluminum ducts
- Wind speeds of 45-50 MPH
- C&N Tractors has produced 23 Double Barrel Bug Vacuums

Figure 3: C&N and Strawberry Center Double Barrel Bug Vacuum in Southern District.

Northern District: Watsonville & Salinas

- Growers typically utilize beds with two plant-lines each
- Typical bed spacings are 48” and 52” center-to-center
- 56” also used in some cases
- All tractor-driven equipment must match the bed spacing used by a particular grower
- Growers using 48” or 52” spacings will often space tractor wheels to span two beds (96” wheel spacing center-to-center)
- Bug vacuums on tractors that span two beds will often cover 4 beds at a time
- Bug vacuums on tractors that span a single bed will usually cover 3 beds at a time
- Typical 70 HP tractors used in Watsonville & Salinas have surplus power when running a conventional two-row bug vacuum (3 beds or 4 beds)

Figure 4: Berries with damage sustained from Lygus bugs.

Figure 5: Conventional 4 row bug vacuum in Watsonville

Figure 6: Conventional vacuum (left), C&N single barrel (middle), Strawberry Center Aluminum Prototype Single Barrel (right).

Results and Discussion

- Field testing showed a 3.1x increase in efficacy over conventional bug vacuums
- More efficient and robust design
- 1 larger fan covers 2 plant lines
- Utilizes three 30-inch fans housed in corresponding 24-inch long cylindrical aluminum ducts.
- Windspeeds of 45-50 MPH
- C&N Tractors has produced 12 Single Barrel Bug Vacuums

Figure 7: C&N and Strawberry Center 3 row Single Barrel in Northern District.

Conclusion

The research completed by the Cal Poly Strawberry Center and the California Strawberry Commission resulted in the design and implementation of more powerful and effective bug vacuums. Working with C&N Tractors has provided the growers with a well-built machine supplied by a trusted manufacturer. The increased performance of the new vacuums means that the growers can have an additional tool to help diminish the effect lygus have on strawberries without the use of pesticides.