

Use of Puffer® pheromone aerosol dispensers for mating disruption in orchards



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Introduction



- ❖ Puffers® are metered, mechanical mating disruption devices loaded with aerosol formulations of sex pheromone for season-long implementation of mating disruption. They release a metered volume of pheromone at electronically-controlled intervals that is highly independent of weather conditions and can be restricted to the period of the day that the target pest is sexually active.
- ❖ Puffers® are applied to orchards at a rate of 2-5 units per hectare, while conventional hand-applied reservoir dispensers are applied at rates of 250 units per hectare or higher, thus allowing growers to significantly reduce labor costs when implementing mating disruption. Labor savings were quantified at 63-68% over a two year period by a large Oregon (USA) pear grower. Manufacturer's service program has increased that savings to 72-73%.
- ❖ Use of the technology is well established and spreading, especially in the USA, but also in Europe, South Africa and South America. The Puffer® has been used for control of *Cydia pomonella* (codling moth) since 1996, for control of *Amyelois transitella* (navel orangeworm) since 2001, and for control of *Grapholita molesta* (oriental fruit moth) since 2003. Numerous field trials have demonstrated that the Puffer® provides equivalent control of codling moth and oriental fruit moth as compared to hand applied passive-release reservoir dispensers.
- ❖ Despite widespread adoption and proven efficacy of the Puffer®, the exact mode of action toward the target pest is still a topic of debate. Tests in pear orchards indicated that a single Puffer® strongly reduced codling moth trap captures over several hectares, and at distances over 300 m downwind. The impacts included both delay and frequency of trap finding (Casado *et al.* 2014).

Puffer History

Puffer® use was pioneered in 1996 by Dr. Harry Shorey, who started an area-wide program in Lake County, CA pears with Rachel Elkins – UC Cooperative Extension. Puffers® are the predominant mating disruption technology used today in the CA pear industry (Elkins 2014).

Dr. Alan Knight (USDA-ARS Wapato, WA) started testing Puffers® in the Pacific Northwest of the USA in 1998 and his research helped determine the current label recommendations of implementation in a grid pattern throughout the orchard (Figure 1) (Hansen 2008.)

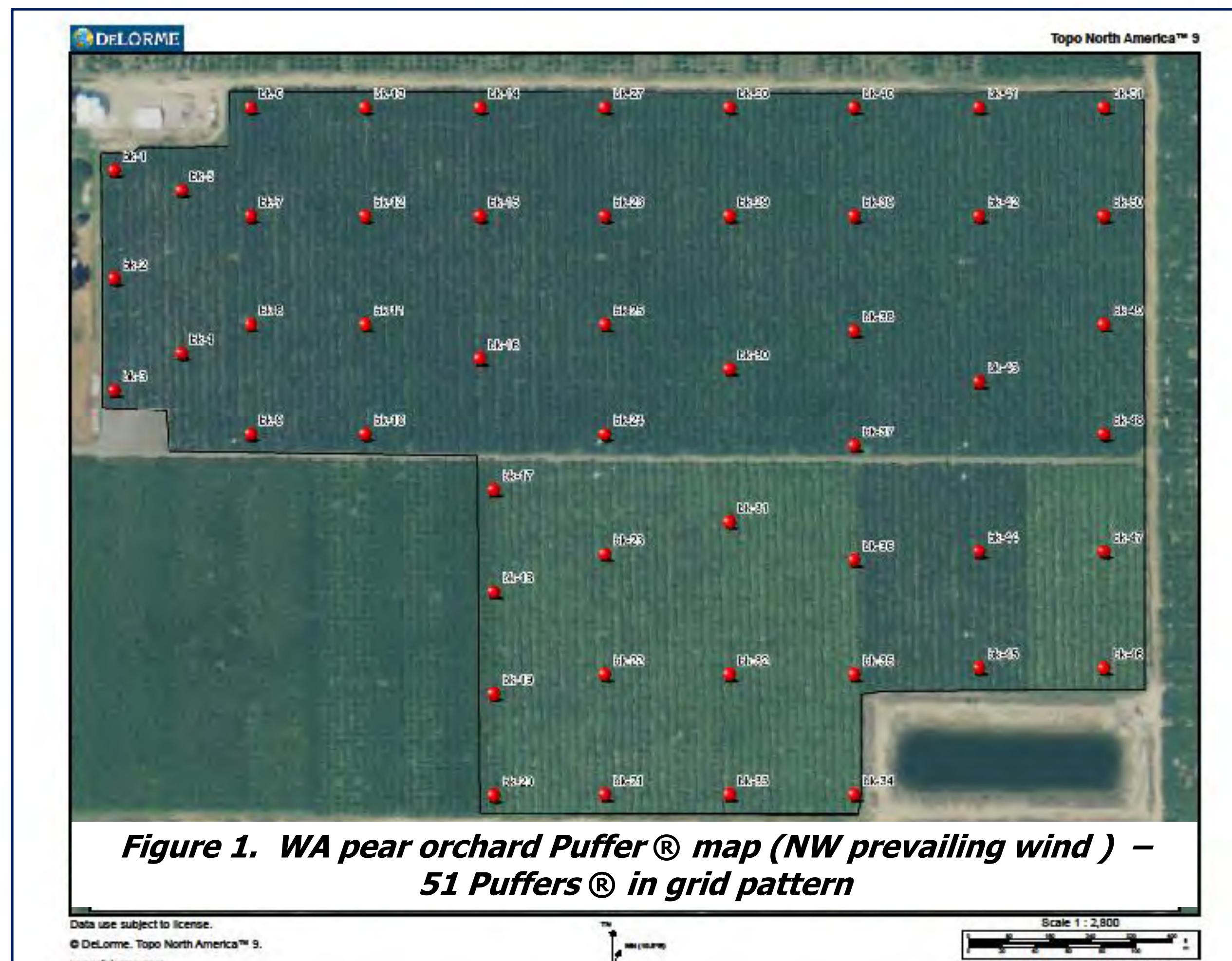
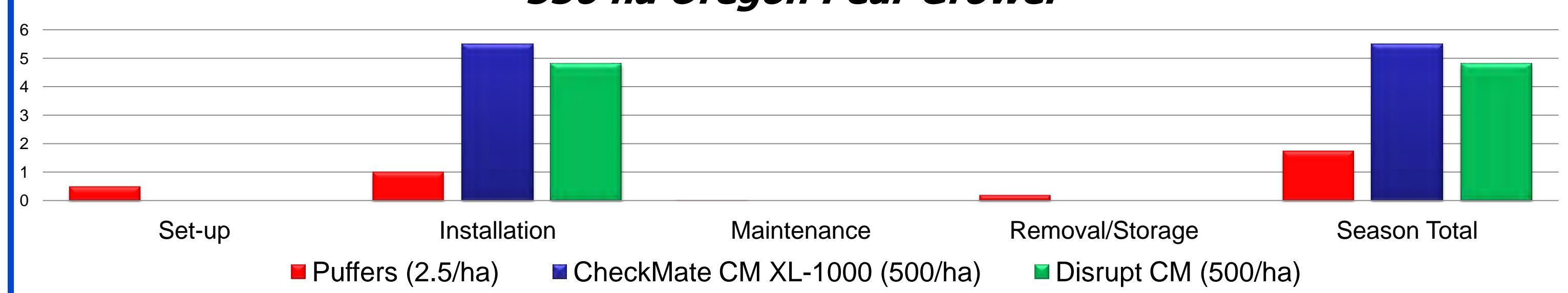


Figure 1. WA pear orchard Puffer® map (NW prevailing wind) – 51 Puffers® in grid pattern

Labor Savings

A two-year grower study of labor costs to implement mating disruption resulted in significant labor savings with use of Puffers® versus passive-release dispensers (Hanson 2008) (Figure 2.) Grower is in 9th year of Puffer® use for implementation of codling moth and oriental fruit moth mating disruption. Recent introduction of a delayed-start function and comprehensive manufacturer's service program has further enhanced labor savings.

Figure 2. Labor Hours/Ha - First Year Implementation
Codling Moth Mating Disruption
550 ha Oregon Pear Grower



Efficacy Data

Dr. Jay Brunner at WA State University conducted field trials using sterile codling moth releases in apple orchards comparing Puffers® (2.5/ha), Isomate® Flex (800/ha), and an untreated control. Trap inhibition was recorded, and Puffers® were determined to be as effective as the commercial standard passive-release reservoir dispensers (Fig.3) (Brunner & Wiman 2012.)

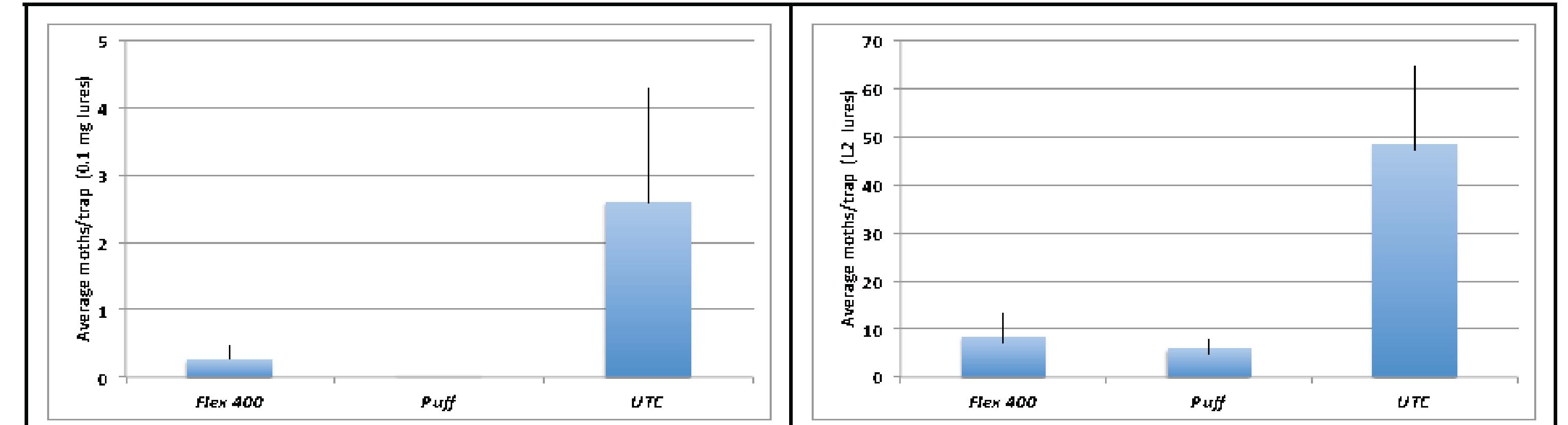


Figure 3. Average sterile moths per trap monitored with 0.1 mg lures, June 6 – July 13 (left) and with Trécé L2 lures, (right), July 20 – Sept 7.

Area of Influence

In an effort to estimate the area of influence of a single Puffer® on codling moths, Drs. Steven Welter & Daniel Casado at UC Berkeley conducted a series of trials in unfarmed and low management pear orchards using grids of traps baited with pheromone lures or virgin females. Results indicated a single Puffer® strongly reduced trap captures over several hectares, and at distances over 300 m downwind. Furthermore, their impact included delay and reduced frequency of trap finding (Figure 4) (Casado *et al.* 2014.)

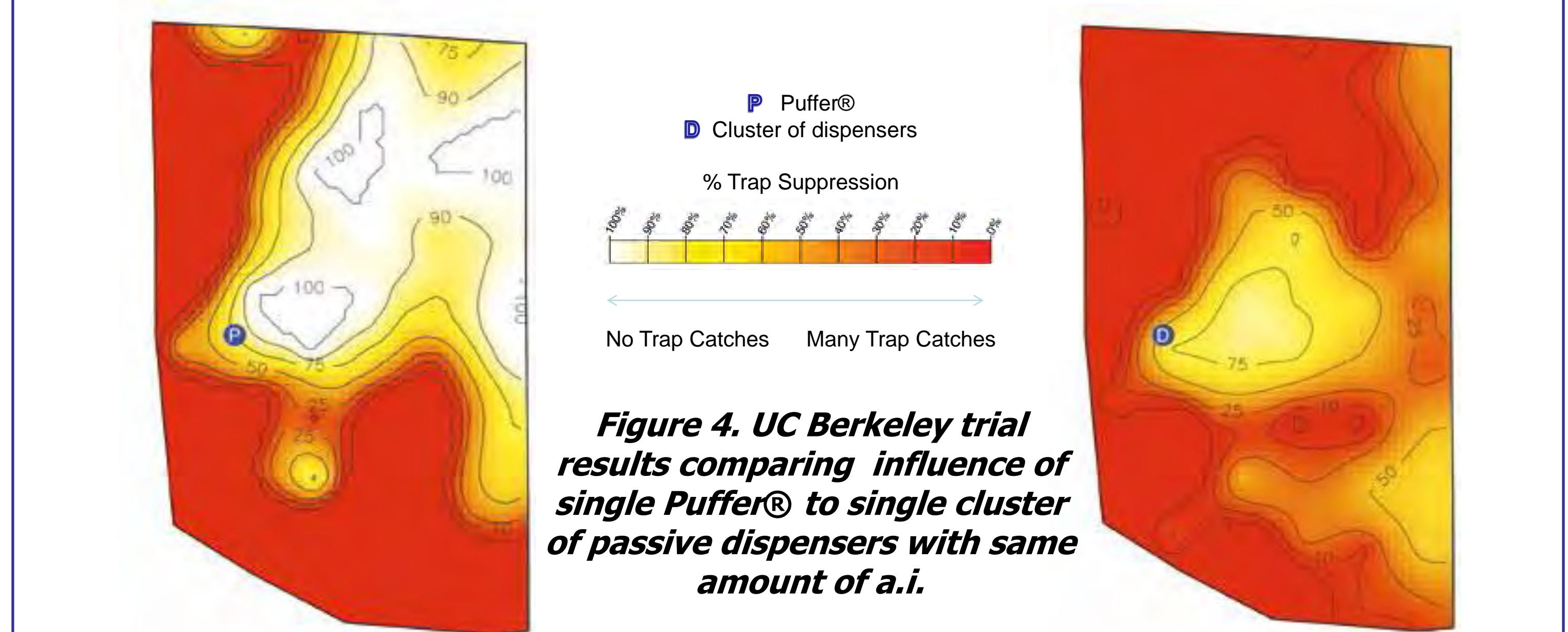


Figure 4. UC Berkeley trial results comparing influence of single Puffer® to single cluster of passive dispensers with same amount of a.i.

Conclusions

University trials and long-term adoption programs have confirmed active-release aerosol Puffers® (at density of 2.5 point sources per hectare) can provide efficacy comparable to passive-release dispensers (that require a density of 250 source points or more per hectare.) Puffer® aerosol technology can enhance implementation of mating disruption while maintaining efficacy and reducing labor costs.

References

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