Laser Scarecrow Technology for Prevention of Bird Damage

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The Problem: Birds Damage Crops

- Starlings and blackbirds in sweet corn, sunflowers, and grain
- Robins, starlings and cedar waxwings in blueberries and cherries
- Canada geese on sod and winter grains
- Crows in corn – especially seedlings
- Starlings and orioles in grapes
- Crows in Honeycrisp apples

Challenges of Bird Control

- Bird pressure is highly variable, across farms and years
- Control strategies most effective when in place before birds discover the crop
- Exclusion netting is highly effective but expensive and labor intensive
  - Infrastructure costs not economically feasible for sweet corn, grain, large orchards/vineyards/berry fields
  - Labor requirements can be problematic for smaller orchards and berry farms with minimal staffing
- Mixed reports on effectiveness of taste repellants
- Auditory deterrents moderately effective and economical for large fields but create noise pollution
- Flash tape, scare balloons, monofilament grids, etc. limited to small fields

Laser Bird Deterrents (aka Laser Scarecrows)

- Originally developed for airports and industrial sites
- Utilize visible wavelength laser beam (usually 532 nm green) delivering 30 to 40 mW/cm^2
- Many diurnal birds have color vision 10X better than normal human; particularly sensitive to green
- Beam moves in circle on horizontal plane; may also move vertically
- Computer control allows for variable movement, either random or user-programmed
- Coverage area depends on laser power, terrain, and crop – up to 20 acres
- Powered by battery and solar panel – temporary installation; moveable

Laser Scarecrows are exciting, but do they work?

Experiment #1: Sweet Corn

- Split field design; analyzed using paired t-test
- Replication over multiple harvest dates, August 2017 and 2018
  - URI Gardiner Crops Research Center and commercial farms in RI
- Naturally occurring “infestations” of redwing blackbirds and starlings
- Damage measured by counting number of damaged ears in each field section at harvest, expressed as percent of total yield
- Used URI-designed laser scarecrow units

URI Laser Scarecrow, 2017 version

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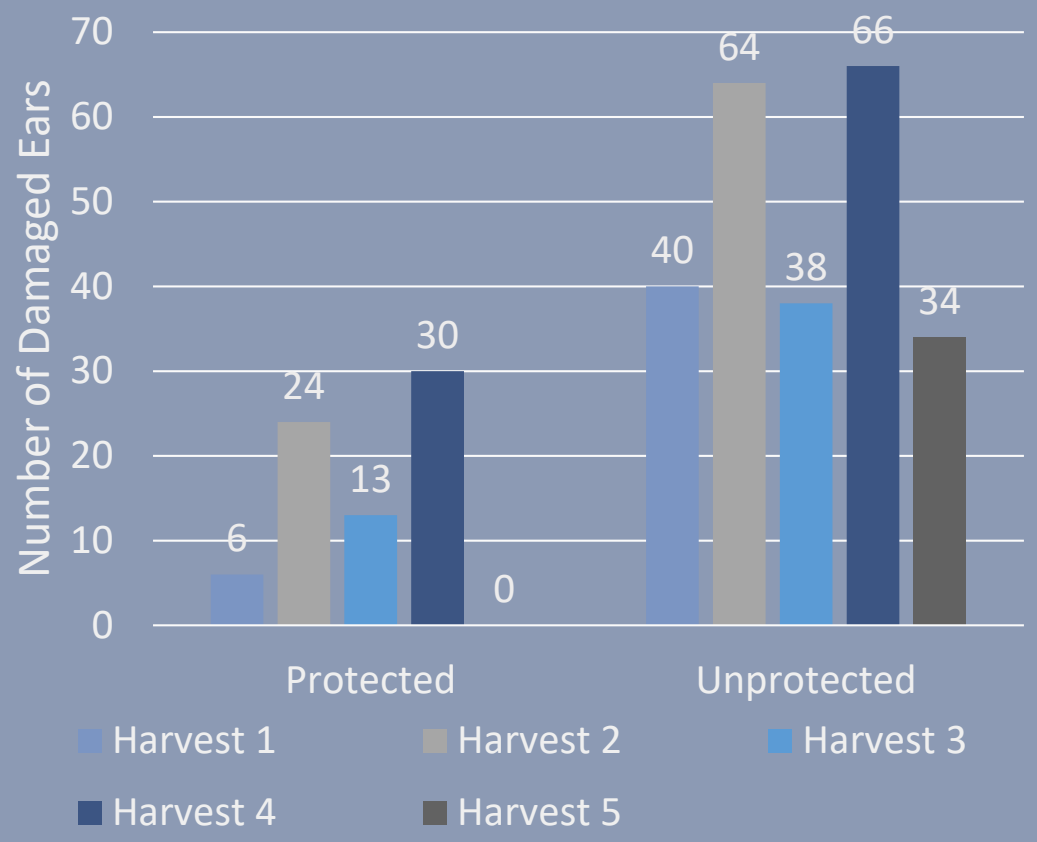
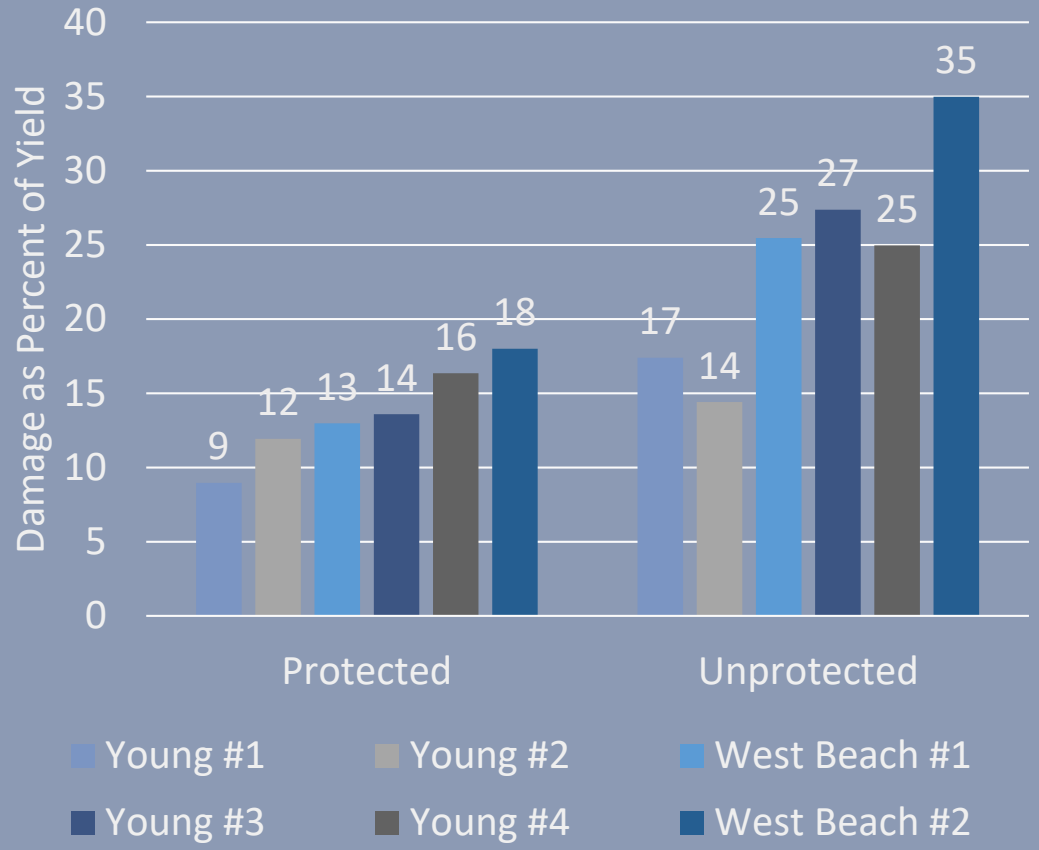
2017



P = 0.005 but overall damage < 10% due to low bird pressure. Multiple harvests from single planting of mixed maturity dates. Protected and unprotected areas swapped after each harvest.

2018



P = 0.01. Typical bird pressure for these commercial farms. Each harvest is a different planting and field.

Conclusions

- Laser scarecrows significantly reduce bird damage in split-field trials
- Growers have reported <10% damage when entire fields were protected
- Scarecrows must be in place before birds discover the corn, and beam height relative to crop canopy is key
- Need additional studies in larger fields to determine maximum coverage area

Experiment #2: Blueberries

- Conducted on three commercial PYO berry farms in RI during 2018 harvest
- Used Autonomic 500 mW laser bird deterrents (Bird Control Group)
- Two fields selected at each farm. One equipped with an Autonomic unit, other left unprotected.

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- Three pairs of bushes - matched for size and expected maturity – selected in each field.
- One bush in each pair enclosed in bird netting to determine yield in absence of birds
- Berries hand harvested and weighed; yield difference between netted and un-netted bushes determined for each pair
- Differences compared between treatments using ANOVA with pairs as replicates

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Results

- One farm dropped due to low bird activity
- Data combined across remaining farms for analysis by ANOVA
- In fields without lasers un-netted bushes yielded 25% LESS than netted bushes
- In fields with lasers un-netted bushes yielded 6% MORE than netted bushes
- Differences were not statistically significant (P= 0.12) but could be economically significant

Conclusions

- Robins were the primary birds controlled
- Larger, more homogeneous blueberry plantings would yield stronger results
- Need more replications – will repeat study in 2019
- Small numbers of catbirds, cedar waxwings, and sparrows were observed feeding in laser treatment fields

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Do Laser Scarecrows Work?

- Sweet Corn: Probably. Harder to use than propane cannons but less annoying to neighbors and likely more effective.
- Blueberries: Maybe. Probably not as well as netting.

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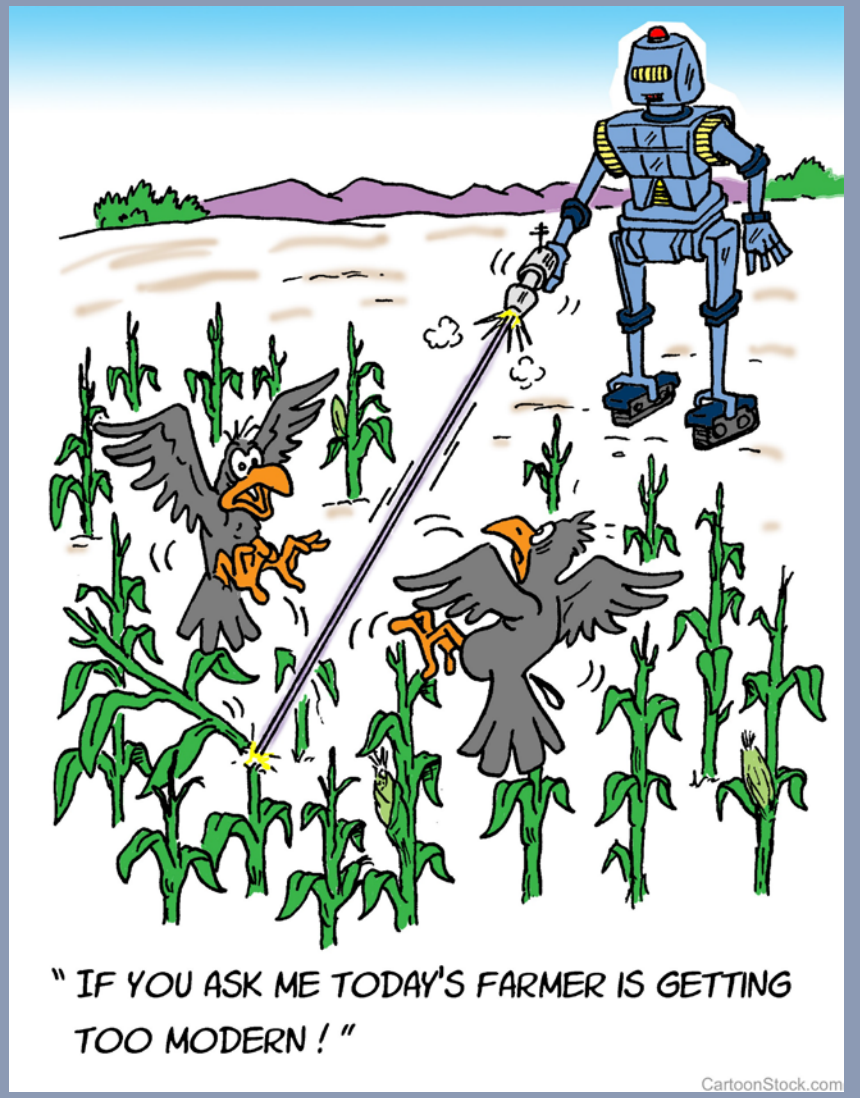

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