The use of new bird deterrents in Niagara vineyards

Overview
Bird depredation is a major threat to grape and other berry crops throughout Ontario and North America. It appears as though bird predation is escalating, especially in the Niagara Peninsula where the majority of Ontario’s grapes are grown. In many cases, current methods being used to control bird damage cause social disturbance due to noise from control equipment (i.e. propane cannons, distress calls). Therefore, new bird deterrent technologies are being trialed as a potential way for controlling bird predation in a safe, quiet and effective manner. These include the use of light based deterrents and American Kestrel nesting boxes. These deterrent strategies are being tested for their efficacy for controlling bird damage and to study their impact on bird activity in vineyards with bird species typically found in Eastern North America. The objectives of the research are to measure the efficacy of this new methods for preventing bird damage with core white and red grape cultivars grown within the Niagara Peninsula, estimate bird pressure and activity at different vineyard locations within Niagara and determine any effects that the bird deterrent may have on bird activity/presence and finally improve our estimation of the level of bird damage experienced in vineyard blocks across Niagara.

Site Selection
Vineyard sites containing blocks of white and red grape varieties were used for the trials. These sites were distinct from each other in order to replicate treatments and evaluate the efficacy of bird deterrents on independent bird populations.

Experimental design
Each block outfitted with bird deterrents had protected and unprotected areas based on manufacturer’s recommendations for coverage and information based on previous research studies. The study period was from veraison until commercial harvest for each variety. Each variety block was divided into protected and unprotected zones. Five strata were set up in each zone for estimating bird damage and monitoring bird populations within research blocks. As per Tracey and Saunders (2010), the research blocks were divided into five strata: Stratum 1 and 2 were composed of the perimeter rows along the short borders block, Stratum 3 and 4 were composed of the perimeter rows along the long borders of the block, and Stratum 5 was located within the interior of the block. Within each of the four exterior subplots, 10 vines were selected and for the interior subplot, 20 vines selected for sampling vines total. Another 50 vines were used for geospatial analysis of bird damage within each block. These vines were geo-referenced in an equidistant grid pattern so that spatial analysis can be performed to examine spatial variability of bird damage in trial vineyards and help elucidate the approximate range for each bird deterrent used.

Estimating bird damage to grapes in research blocks
To assess damage done to wine grapes within the research blocks, the study by Tracey and Saunders (2010) was used. Clusters were chosen at random to be visually evaluated for bird damage. An additional cluster was taken from one in ten vines to quantitatively assess bird damage in order to correct for human error in visual assessments, as suggested by Saxton (2006). Damage was evaluated by the number of pecked and plucked berries in the grape cluster.
Monitoring bird populations in research blocks
In order to evaluate the effectiveness of the bird deterrents, the abundance and distribution of key bird species were monitored during the period of study. The observations were made during the dawn to late morning period when birds were most active (from dawn to approximately 1100hrs) (Berge et al. 2007, Dunn et al. 2006) without significantly disrupting bird activity. Counts did not only identify the number of birds within the research block but also identified the specific strata (1-5) in which the birds were found.

Fruit composition, statistical and geospatial analysis
Fruit maturity was tracked from veraison through harvest to correlate maturity with bird predation and/or activity within vineyards. Sampling occurred weekly from veraison to harvest and will grapes will be tested for soluble solids and acidity. Bird damage and bird activity assessments were analyzed throughout the course of the trial and following harvest of each cultivar. Alongside traditional statistical methods, data was also analyzed geospatially using ArcGIS. Spatial interpolation of the data allowed patterns of bird damage and activity throughout veraison to be visualized on maps of the vineyard blocks, thus mapping the effectiveness of bird deterrents throughout the maturation period. Spatial analysis of the data also provided information on the range of effectiveness, the location and behaviour of local bird populations, and hot spots of bird damage.

General Conclusions
- Assessing bird activity and bird damage is a challenging task.
- Bird activity varies significantly between vineyard blocks in terms of pressure and species present.
- Bird deterrents reduced bird damage at some vineyard sites
- Damage varied within vineyard blocks and between sites
- Bird damage results in economic losses that are likely not taken into consideration unless at severe levels where growers can see obvious damage.

Contact
Jim Willwerth, PhD
Senior Scientist in Viticulture
Cool Climate Oenology and Viticulture Institute
jwillwerth@brocku.ca 905 688 5550 ext. 5477

Susan Fitzgerald, B.A., Dip. Ag.
Program Manager, Fitzgerald & Co.
Susan.tfio@sympatico.ca 519-669-3350

Collaborators
Hugh Fraser (Ontario Ministry of Agriculture and Food), Ian Frensch (C. Frensch Ltd), Susan Fitzgerald (Fitzgerald & Co.), Grape Growers of Ontario, Ontario Fruit and Vegetable Association.

Funding
Ontario Vineyard Improvement Program, EverEdge IP®, Agriculture-Wildlife Conflict Strategic Funding.

References
Saxton, V.P. 2006. Sustainable Farming Fund Project L05/036: To develop a robust statistical method for assessing bird damage to crops, particularly fruit. Sustainable Farming Fund, NZ.