Frost Protection Methods in Michigan – Costs and Considerations

Amy Irish-Brown, Tree Fruit IPM Educator, MSU Extension
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November 4, 2012

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| **Coverage**             | Depends on air movement | Oil-Fueled: 40 heaters/acre  
Propane-Fueled: 60 heaters/acre | Approx. 10 acres | Large = 40 to 60 acres  
Smaller = 25 to 40 acres | Approx. 10 to 13 acres | limited by well size  
(35 GPM for 10+ hours) | uniform |
| **Power Options**        | NA                       | oil, diesel or propane    | Gas, Electric, PTO | fuel            | Gas, Electric, PTO, Diesel  
(most new are propane) | electric | NA |
| **Unit Cost**            | cost of old hay bales or brush piles is usually minimal | Oil-Fueled: Approx. $50 each = $2,000/acre  
Propane-Fueled: Approx. $100 each = $6,500/acre | Approx. $13,500 | Rental cost:  
Large = $1600 per hour per bird  
Small = $700 per hour  
(+travel & fuel time) | Approx. $16,000-$35,000 | well, irrigation system plus extra  
$1000 per acre for microsprinklers | $10 to $25 per acre |
| **Fuel Consumption for One Hour** | NA                       | Oil- and Propane-Fueled: 1 gal./hr/heater | Approx. 1 gal./hr | included in rental | Approx. 13 gal./hr | electricity cost | fuel for tractor |
| **Installation Cost**    | cost of old hay bales or brush piles is usually minimal | movement to site | cost to move - grower installed | minimum hours for standby | Cement Pad + Installation (often included in total unit cost) | added on to irrigation system install costs | time of operator |
| **Maintenance Cost**     | tending to burn | Significant - heaters should be cleaned after 20-30 hours of use | Minimal: Owner Maintained | NA if hired in. | can be covered under contract, but mostly minimal unless a gearbox goes | adds more time for microsprinkler care than regular trickle irrigation | some materials are hard on sprayers |
| **Auto-Start Available** | NA                       | NA                 | Yes            | NA              | Yes                  | Yes? | NA |
| **Enhances Other Frost Protection** | Yes: Wind Machines | Yes: Wind Machines | Yes: Wind Machines, Sprinklers, Heaters  
?? | Yes: Heaters | perhaps | perhaps |
| **Quiet Factor**         | Yes, but can cause smokey conditions | Yes, but can cause smokey conditions | No (63-66dB) | Not really | No (90 dB) | Yes | No (sprayer/tractor noise) |
| **Special Weather Concerns** | Not in high winds or dry conditions. | Yes | Yes | Less coverage if it is very cold. They can move vertically to find the warm air inversions. | Yes/No | Yes | No |
| **Dual usage factors**   | recycling                | NA                 | NA             | for fun if you fly one | might help with fruit finish | irrigation in summer cool effect in dormancy to prevent bud break??? | NA |
| **Years of usefulness**  |                          |                    |                |                 |                     |                 |                           |
Burning Hay Bales
Burning Hay Bales

• Cost
  – bales, time to set out and tend
• Effect – little
• Annoying to neighbors
• Not to be used in dry conditions
Smudge Pots
Smudge Pots
Smudge Pots or Heaters

• Costs –
  – time to set out, fill and tend
  – $50 each if you can find them ($100 for propane heaters??)
  – Cost of fuel = 1 gal/hour/heater

• Effect – little to some

• Perhaps some benefit when used with fans
Frost Fans/Wind Machines
Frost Fan Types
Cold Air Drain Fan
Cold Air Drain Fan

• Costs
  – Unit cost = $13,500
  – Fuel use – 1 gal/hour (gas)
    • Units can run on gas, electric, PTO
• Installation – can be moved easily
• Could enhance other frost protection methods
• Where does the cold air go???
Frost Fans
Frost Fans/Wind Machines

• Costs
  – $16,000 to $35,000 installed
    • Some require a cement pad and fuel tank plus drive to refill
    • Portable units are less costly overall
  – 12 to 13 gallons per hour/unit

• Benefits
  – Covers 10 to 13 acres (less if really cold)
  – Auto start
  – Improving fruit finish

• Limited by number of units in the area/location
Helicopters
Helicopters
Helicopters

• Costs
  – $700 to $1600 per bird per hour (4 to 7 hours/night)
  (+travel time & fueling time)

• Benefits
  – Large area coverage:
    • Large = 40 to 60 acres
    • Smaller = 25 to 40 acres
  – Can move vertically to find thermal layers using infrared cameras
  – Can move from site to site

• Limited by number of units in the area
MicroSprinklers
MicroSprinklers
MicroSprinklers

• Costs
  – Well, irrigation system PLUS $1000 to $1200/acre for microsprinkler heads
  – Electricity to run
  – Maintenance is higher than drip irrigation systems

• Benefits
  – Covers as many acres as your well can cover
  – Dual usage as irrigation

• Water Source Capacity
  – Have to run until all ice is water again.
  – 35 GPM for 10+ hours
Sprayable Materials

• Commercial Materials
  – Glacier
  – KDL
  – Mega-Fol plus K-Leaf tank mix

• Experimental Materials (delay bud break):
  – Promalin
  – Kaolin Clay
  – Latex Paint
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