



United States Department of Agriculture Midwest Climate Hub

Adaptation Resources for Agriculture

A Case Study: Organic Apple Orchard in Wisconsin

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Working farm lands and specialty crop farms are an important and dominate part of Wisconsin’s Driftless region providing a multitude of agricultural products and jobs. One of the many challenges facing the specialty crop producers in this region and throughout the US is climate change. [Brix Cider](#) of Barneveld, WI participated in the Adaptation Workbook* 5-step process to see if there are ways for their operation to become more resilient in a changing climate.

*For more on the Adaptation workbook, visit

<https://www.climatehubs.oce.usda.gov/sites/default/files/AdaptationResourcesForAgriculture.pdf>

Brix Cider: Working through the Adaptation Process

1 DEFINE: Lay out management goals and objectives. Brix Cider’s goal in general, is that “cider should be something beautiful. It should be simple. It should be about the land, the people who grow the apples and drink the cider, and the connections between us all.”

2 ASSESS: While there are numerous climate change impacts and vulnerabilities that will affect Wisconsin agricultural, Brix Cider noted two impacts that will undoubtedly present challenges to their operation; The increase in average temperature which encompasses swings in temperature in January and February that break

the dormancy of apple trees and cause winter kill; And secondly, the longer frost-free seasons occurring and projected that will include erratic and major temperature swings, that at the wrong time can damage the fruit crop resulting in large loss of apple production.

3 EVALUATE: In the table below the management challenges and opportunities that may occur as a result of climate change are recorded with the feasibility of meeting management objectives under current farm management are listed. In this table, it is understood that the land unit for each item is the entire orchard.

Step 3: EVALUATE Management Objectives Given Projected Impacts and Vulnerabilities

| Objective | Challenges to Meeting Management Objective with Climate Change | Feasibility Objectives under Current Management | Other Considerations |
|---|---|---|---|
| Yield-Growing for highest production and minimum inputs | <i>Temperature swings</i> with warmer winters, frost damage, and increased disease and pest pressure | Short term-High, Long term-moderate to low | Financial-market prices, crop loss, increase cost to purchase apples & increase cost in harvest and distance to alternative suppliers (greater than 30 miles) |
| Adding Geese for orchard floor | <i>Increase night time temps and moisture</i> increase pests, decrease in forage production during July and August and have to supplement feed and water to geese or harvest geese. | Short term-High, Long term-moderate to low | Financial-spray more or use more biological controls and possible increase cost of apples from other growers |

For more information on the Midwest Climate Hub, please visit:
<https://www.climatehubs.oce.usda.gov/hubs/midwest>

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4 IDENTIFY: The fourth step delves into brainstorming tactics that can be implemented to enhance the ecosystem’s ability to adapt and meet management goals. During the workbook exercise Brix Cider discovered numerous tactics that they are or could implement: Plant several varieties with different flowering times to offset losses due to temperature swings, plant on north slope to keep trees from flowering too early in spring thus reducing injury risk and plant a variety of forages for pollinators, geese (natural bio control) and maintain constant ground cover (soil health). Below is a partial list.

5 MONITOR: Throughout the workbook exercise it was clear that Brix Cider is continually looking for avenues to improve the land that provides for their apple orchard. The Tactics listed in step 4 can be implemented anywhere from this current year to 2020 to longer term. Brix cider’s environmentally conscientious ethos allows them to mitigate their direct affects on the changing climate over time and adapt to the current and anticipated climate changes to remain a local leader in environmental stewardship.

Step 4: IDENTIFY Adaptation Approaches and Tactics for Implementation (partial list only)

| Adaptation Action | | Benefits | Drawbacks & Barriers | Feasibility |
|--|--|--|--|-------------|
| Approach | Tactic | | | |
| 4.4 Reduce severity or impact of temperature extremes | Plant several varieties with different flowering times | Reduce your chance of total crop loss | Makes management very hard with crops flowering at different times for spraying and harvesting | High |
| 4.4 Reduce severity or impact of temperature extremes | Planting north slope to keep trees from flowering early in spring, reduces risk | Reduce your chance of total crop loss | Limited by landscape | High |
| 4.4 Reduce severity or impact of temperature extremes | Frost protection by spraying water at high risk times | Insulates the flower from freezing | Limited by equipment, need large tanks, and spray equipment. | Medium |
| 2.1 Reduce the impacts of pests and pathogens on crops | Geese, timely mowing, and spraying. | Marketing tool to see biological control in an orchard and provide future meat for restaurant. Increase in nutrient cycle, plant diversity and OM for soil health | Cost of infrastructure (food, water, fencing, and shelter) and cost of livestock | Medium |
| 5.2 Promote biological diversity across the landscape | Plant a variety of forages for both pollinators, support the geese, and to maintain constant cover | Marketing tool to see biological control in orchard & provide meat for restaurant. Increase in nutrient cycle, plant diversity and OM for soil health. Beneficial insects to control pests & increase pollination. | Cost, time, and management | High |

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The Take-Away

The [Adaptation Resources for Agriculture Workbook](#) can be a valuable process for any agricultural producer to undertake as long as one is willing to think outside the box and look beyond next year’s cropping or grazing season. Take action now to improve your operation and production resiliency.

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