The Role of Apple Trees in the Haliburton Local Food System: Report

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Context of the community

Haliburton County resides on Treaty 20 Michi Saagiig territory and within the traditional lands of the Michi Saagiig and Chippewa Nations, known collectively as the Williams Treaties First Nations, encompassing various communities like Curve Lake, Rama, Hiawatha, Alderville, Scugog Island, Beausoleil, and Georgina Island First Nations (County of Haliburton, 2020). Spanning 4,009.47 square kilometers, the region boasts a median age of 59.2, with most people falling between ages 16 to 64 years old (Statistics Canada, 2021). The county's landscape, characterized by vast forest land and lakes, presents formidable obstacles for local crop cultivation and farming. Factors like soil quality, climate, and a shorter growing season further compound the agricultural limitations. Gordon (2023) notes that early pioneers settling in the 1800s, many of whom were farmers, brought varieties of apple trees to the area to supplement their diets in various ways. Haliburton County, nestled in a remote rural area on the Canadian Shield, has experienced a notable 27% increase in its population since 2006, reaching 20,571 residents by 2021 (Statistics Canada, 2006). Despite this population growth, the county faces significant challenges regarding access to nutritious food. Alarmingly, approximately 16.7% of families lacked access to clean, healthy food in 2021 (Public Health Ontario, 2021). This means individuals were lacking the essential nutrients needed in everyday life. In response to access to food challenges in a community, one of the recommendations by Adamson et all (2019) is the importance of exploring innovative techniques, such as apple tree farming, which also adds to enhancement of local food system. According to Food Banks Canada (2023), there was a troubling 32% increase in usage compared to March 2022 and an even more concerning 78.5% increase compared to March 2019 in Canada. With that, in the County of Haliburton, City of Kawartha Lakes and Northumberland County “25.9 per cent of households living in rental

housing are food insecure" (Haliburton Kawartha Pine Ridge District Health Unit, 2022). With the surge in food bank usage is particularly alarming among seniors, who now constitute 8.0% of food bank clients compared to 6.8% in 2019 (Food Banks Canada, 2023). Given Haliburton's median age of 59.2, addressing food insecurity among seniors emerges as a pressing concern for the community. Food insecure older adults are at higher risk of fair or poor health, with commonly associated co-morbidities such as diabetes, depression, hypertension, heart disease, and gingivitis, alongside limitations in activities of daily living (Pooler et al., 2019). These challenges faced by Haliburton County underscore the importance of recognizing the evolving needs of its population and ensuring access to essential resources. Implementing strategies to bolster access to local food, despite geographical constraints, is paramount for enhancing community health and well-being. Research by Fang et al. (2021) underscores the significant correlation between food insecurity and mental health, indicating a 257% higher likelihood of anxiety and a 253% higher likelihood of depression. Furthermore, addressing the unique vulnerabilities of seniors in combating food insecurity is crucial for fostering a resilient and inclusive community in Haliburton County. Given the prevalence of food insecurity and its impacts on mental health, with limited access in range of local food sources it underscores the necessity to improve local food access within the town of Haliburton. 15 Local food producers can be accessed in Haliburton County through small homesteads throughout the county. Some of these local farms can be accessed at http://www.harvesthaliburton.com/local-food-access-map.html (Casper, 2022). Can also access Abbeys Garden, Minden Farmers Market, and Haliburton Farmers Market, all in Haliburton from may till October. Due to the fact these farms are not located in the town of Haliburton and the Farmers Market runs 1 day a week May till October there is a need to enhance local food access in Haliburton. With the County of

Haliburton covering a large land mass It can make it difficult for individuals with limited accessibility and transportation to access local food due to farms being in far proximity and farmers markets only running once a week May till October. According to Guzu (2019) local trees that produce edible fruits additionally enhance nutritional intake and dietary variety, thereby promoting a sustainable local food system. Edible fruit trees can add variety to local food system and increase access to healthy food. By developing and enhancing a local food system, it can support local farmers, reduce carbon production, allows for individuals know where their food is coming from with loss processed chemicals and GMOs for longer shelf life. In conclusion, it is imperative to bolster local food access, despite geographical constraints, to enhancing community health and well-being.

Benefits and contribution of apple trees as part of a sustainable food system

Apples reign supreme as Canada's largest fruit crop, constituting a significant 39.8% of the nation's total fruit production (Agriculture and Agri-Food Canada, 2023). Wormsbecker's consumer survey (2007) underscores a palpable interest in purchasing local products, yet hurdles such as limited awareness and logistical challenges impede widespread adoption. Apple trees, renowned for their hardiness and low maintenance requirements, play a pivotal role in fostering sustainability. (reference Andy's report)

Apples, integral to a sustainable food system, offer myriad benefits to the Haliburton community and the environment. Not only do they boast a lengthy shelf life and exceptional nutritional value, but they also showcase remarkable versatility in various culinary endeavors. As highlighted by Bondonno et al. (2017), apples serve as a rich source of nutrients, lending themselves well to both raw consumption and diverse culinary creations**.** Apples are very versatile in the sense that they can be consumed in various ways such as pies, apple sauces, beer, and cakes Gorden (2023) notes that There is the opportunity to attract physical resources to the

County, such as an apple press, and collaborate with local breweries if they are interested in producing cider from locally cultivated apples**.** The scarcity of fresh food, as noted by the Metcalf Foundation (2008), underscores the critical need for accessible, locally sourced options, especially in smaller urban and rural areas like Haliburton. Despite Ontario's vast agricultural potential, the cultivation of only fifteen apple varieties for commercial purposes, as reported by the Ontario Apple Growers association (2023), signals untapped potential and room for growth.

Apple Trees in Haliburton County

As Haliburton County explores its rich apple heritage, the identification of numerous apple tree locations and the historical significance of its apple varieties set the stage for understanding its agricultural landscape and the challenges it faces. Recently “ATIP Haliburton identifies over 170 apple tree locations including 10 orchards, of which has 200 apple trees” in Haliburton County (Gordon, 2023). The longstanding connection between Haliburton and apples dates back over a century, as evidenced by references to the 'Haliburton Apple' in The Canadian Horticulturalist (1890). Despite historical acclaim, certain apple varieties in Haliburton, deemed feral by Cronin, Kron, & Husband (2019), exhibit a robust resilience, including MacIntosh, Duchess of Oldenburg, and others, as confirmed by DNA analysis conducted at the University of Guelph (ATIP Haliburton & Galea, 2023). Navigating obstacles such as limited awareness and sourcing challenges is imperative for enhancing access to locally grown foods. By embracing the legacy and potential of apple trees, Haliburton County can forge a sustainable path forward, enriching both its agricultural landscape and community well-being.

Innovative ways of growing food

The enhanced productivity and aesthetic appeal of apples have indeed been achieved through significant advancements in genetic improvement, tree training and pruning techniques, as well as orchard design and management practices. These improvements have undoubtedly

contributed to higher yields and superior fruit quality, meeting consumer demands and industry standards. However, this progress has come at a cost. With an escalating reliance on external inputs such as water, fertilizers, and synthetic pesticides. While these inputs have facilitated increased production and improved fruit aesthetics, concerns have emerged regarding their environmental impact and potential health implications meaning implementing innovative ways of growing apple trees becomes a priority (Lauri et al., 2018). Introducing innovative strategies for planting apple trees to enhance community access to local food may encounter several obstacles. These challenges, which vary based on the circumstances and location, often involve high expenses, limited availability, insufficient awareness, seasonal constraints, and geographic factors. An environmental factor prompting action is the apprehension regarding the detrimental impact of agricultural chemicals, especially pesticides and fertilizers, on soil and groundwater (Metcalf Foundation 2008). When planting apple trees in tight plantings, the intra-tree rivalry encourages trees to yield less wood and more fruit (Ministry of Agriculture Food and Rural Affairs, 2021). Ontario Apple Growers (2018) identify innovative ways farmers can use technology for growing apple trees in Ontario. Cultivars susceptible to early flowering in warm conditions face higher vulnerability to spring frosts, making late flowering a more favorable trait for breeding purposes (Watts et al., 2021). Moving air will prevent frost from collecting on buds, blooms, and leaves if there is a chance of it happening. Some growers have placed huge fans, known as frost fans, in their orchards to keep air flowing and shield their trees from harm. Computerized fans are designed to kick on automatically when temperatures drop below a predetermined point. This keeps the orchard air moving and helps prevent frost (Ontario Apple Growers, 2018). Apple trees are stored in controlled environments since apples are consumed year-round. Apples are like humans as they produce heat by bring in oxygen through their

respiratory system. By retaining the apples in an airtight atmosphere and reducing the oxygen level within from a typical level of 21% down to 2% or 3%, the respiration of the apples in CA storages is fully reduced naturally (Ontario Apple Growers, 2018). By effectively putting the apples to sleep like an animal's hibernation this halts the ripening process until they are ready to be sold. Although we are experiencing warmer temperatures, Ontario continues to experience cold winters. Harvested fruit should be swiftly relocated out of direct sunlight, preferably into refrigerated storage, or at the very least, into shaded areas such as under trees or covers, as research indicates that promptly lowering fruit temperatures post-harvest can lead to firmer fruit with decreased decay (Service Ontario, 2022b). Some farmers use large nets or hail cannon technology to protect apples from hail and other environmental factors that may damage the crop. Sound-wave-based hail cannon technology, which breaks up hailstones in the air before they fall and harm crops (Ontario Apple Growers, 2018). Due to summer hailstorms, a singular storm can damage a crop making it sellable to fresh famers markets. A challenging factor in Haliburton County is labor challenges due to a 11.1% employment rate with only 150 people in the agriculture industry (Statistics Canada, 2021). Based on technology from Israel, researchers at Vineland Research Innovation Centre are developing a prototype for an apple-picking robot (Ontario Apple Growers, 2018). Will evaluate apples for harvest readiness using image sensing technologies before harvesting them from the tree. In orchards, there is a growing trend among apple growers to utilize automated, mobile platforms for tasks such as tying, thinning, pruning trees, and harvesting fruit during the growing season, rather than relying on ladders or ground-based work (Ontario Apple Growers, 2018). Platforms are a medium to high-cost technology, that is easy to implement, reduces labour by 30-50%, provides easy changes in production, and medium training for staff (Slingerland et al., 2021). Ontario Apple Growers (2021) notes that a

trellis system to support trees allows for more mechanization of apple growing not just to produce more fruit. Hardy Fruit Tree Nursery (2021) suggests that bagging their apples was non-toxic solution to keeping insects away from their trees. They put an isolated apple from a cluster in a Ziploc bag with 2 corners cut for air in early spring to prevent bugs from entering and re-using the bag following years. Additionally protecting against sunburn using bags, is a common practice in markets with lower labor costs (Service Ontario, 2022). Although this is a good short-term intervention, more sustainable and cost effect solutions should be used. In summary, innovative technologies and strategies are being implemented to overcome challenges in apple production, ensuring sustainable practices and enhancing community access to local food.

Effects of climate change

Warming temperatures may have a positive and negative effect on apple survival success due potential longer summers, earlier frosts which could result longer apple seasons. Hot temperatures pose challenges for both fruit trees and workers, leading to difficulties in completing orchard tasks promptly, particularly during dry periods when soil moisture depletes rapidly under intense sun and high temperatures (Service Ontario, 2022b). Additionally, harvested fruit left in high temperatures experiences weight loss, reduced quality, and shriveling due to rapid respiration and water loss (Service Ontario, 2022b). To mitigate some of these challenges Surround Crop Protectant, a kaolin-clay product, shields fruit from sunburn, lowers leaf temperature to enhance photosynthesis and yields, and deters various insect pests, despite potentially irritating workers and requiring frequent re-application, especially after rain (Service Ontario, 2022b). However, removing Surround post-harvest may prove challenging, albeit some consumers appreciate residue on stems and calyx ends, potentially causing export issues (Service Ontario, 2022b). Fruit injury, mainly occurring from spring to postharvest, peaks during July,

August, and early September due to increased stress on trees, which limits photosynthesis, accumulates stored carbohydrates, and sugars while increasing the risk of sunburn and tissue damage (Service Ontario, 2022b). As mentioned, cultivars susceptible to early flowering in warm conditions face higher vulnerability to spring frosts, making late flowering a more favorable trait for breeding purposes (Watts et al., 2021). Fruit trees can undergo a process called cold hardiness which allows the tree to withstand extreme cold temperatures. As temperatures decrease in the fall, plants move water from within their cells to the spaces between cells, where it freezes into ice crystals, a process that doesn't harm cells externally but water freezing intracellularly damages them by destroying cell membranes, ultimately leading to cell death (Service Ontario, 2022a). In result keeping trees mostly in controlled atmospheres can prevent damage of the apple trees. Understanding the complexities of climate change on apple orchards and implementing adaptive strategies are essential for ensuring the resilience and productivity of fruit trees in the face of evolving environmental conditions.

Community Collaboration

Harvest Haliburton can advocate for edible fruit trees to be planted in community garden and making them accessible to the community of Haliburton. They can advocate for funding through grants and partnerships in collaboration with community partners**.** Due to Halliburton's significant older population and its remote, isolated location, there is an opportunity to promote physical activity through caring for trees while also enhancing access to local food. The County of Haliburton can play a crucial role in helping the role of apples in the local food system by implementing the Haliburton Public Transportation Implementation Plan. In 2019 Haliburton County reviewed plans to implement public transportation to increase transportation options for residents in the county (Haliburton County, 2020). This can aid in providing citizens

transportation to farms for work and the transportation of trees to be planted and harvested. In public lands the country can plant heritage apple trees and workers can prevent pest infestations and promote tree health, by removing fallen fruit, replace plastic and paper tree guards with wire mesh, and use mulch instead of grass around trees. Research suggests that barriers to local food initiative promotion may arise from things like entry restrictions, insufficient funding, poor governance, poor information exchange, and strained connections between local food system players (Ohberg, 2012). Because of lake areas, protected reserves, and rules, clearing land is difficult in this heavily forested county. The Haliburton Highlands property Trust, for example, oversees 1,200 acres of forest property, which may restrict the amount of land that may be used for further agricultural development (Haliburton Highlands Land Trust, n.d.). By planting trees on public lands such as parks and community gardens will avoid deforestation and the disruptions of ecosystems. The government can implement policies that protect species of heritage trees in the county of Haliburton. The recognition of these heritage trees and helping to reserve heritage orchards for example can help community engagement and the use of the local food system. ATIP can help in identifying what trees are suitable to plant in Haliburton County by indirectly contributing to the knowledge base about fruit tree varieties that thrive in certain climates and regions. Harvest Haliburton, County of Haliburton, ATIP, and their partners can collaborate to foster partnerships to improve access and awareness of the local food system. Local businesses and organizations can provide funding and space to plant and grow apple trees that can sustain the local food system. By collaborating with these partners, the community will have increased access to local nutritious food, with increased knowledge about the local food system and the benefits that come with it. Canadian Tire, as a local corporation with a significant presence in many communities across Canada, can indeed provide resources and funding for

various initiatives, including apple planting projects. By partnering with this organization, it can encourage employee engagement, funding, and collaboration. Abbey's Garden is another community partnership that promotes local food initiatives and gardening techniques. Connecting with Elders within Treaty 20 and gaining knowledge from the Indigenous perspective on how apple trees can help them in gathering fresh foods would provide useful insight for a broader population. These partnerships will promote community engagement and overall health. Guzu (2019) notes that community gardens with locally grown edible trees promote collective care, harvesting, and education about various tree species, fostering a stronger sense of connection to food, land, and community. Implementing edible landscaping for residential and public lands, including backyard and hobby farms, underscores the importance of working with local organizations to encourage community utilization of such initiatives.

Conclusion

In summary, prioritizing food security and a sustainable food system in Haliburton County is paramount for fostering community health. Advancing accessibility to the local food system through heightened knowledge is pivotal in achieving this goal. By forging partnerships with community stakeholders to bolster awareness and resource availability, we can endeavor to cultivate a healthier and more resilient community.

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Appendix

THE HALIBURTON APPLE.—

SIR,—We mail you herewith two apples, samples of an alleged seedling grown in the Haliburton district and which in that section goes under the name of the "Haliburton." Can you inform us if it is simply some old variety to which a new name has been attached? What is your idea of the apples as to quality, etc.? The tree is represented as very hardy and bears heavily every year.—CAVERS BROS, *Galt, Ont.*

This is no doubt a purely local apple, and appears to have some value on account of its beauty of appearance. Prof. Saunders gives us the following description of it:—

Haliburton, grown north of Peterboro, size medium or under, $2\frac{5}{8}$x$2\frac{1}{8}$, form oblate, color pale yellow, nearly obscured on the side exposed to the sun by carmine red, marked with splashes and streaks of a deeper hue. Stalk short and moderately stout, set in a small but rather deep cavity, calyx open with a very shallow smooth basin. Flesh fine grained, creamy white and more or less tinged with pink, rather soft in texture, austere and with an acid taste, with very little flavor, a pretty apple but of poor quality. Ripe latter end of September.

A GREEN FAMEUSE.—Mr. R. W. Shepherd, of Montreal, writes as follows regarding this seedling:—

SIR,—I am sending you to-day, by parcel post, a box containing two specimens of a Fameuse seedling apple. The original tree is growing on our farm at Como, Que.,—must be about 25 or 30 years old—and grew up where some old Fameuse trees formerly stood, but which succumbed to the severe winter which killed off almost all the Fameuse orchards in this province some thirty years ago. The tree is apparently quite hardy. Fruit is (as you will see) larger than Fameuse, but not nearly so much colored, in fact only odd specimens have any blush at all. This apple has been propagated by me to a very limited extent under the name of *Green Fameuse*. When you taste it, you will find the true Fameuse texture of flesh and flavor. I think the variety is worth propagating, being a heavy bearer, good size, excellent quality, and very little, if any, given to spotting. The Green Fameuse having a tougher skin than its parent, carries better and keeps longer. I shall be pleased to send you scions of the variety if you think well of it.—R. W. SHEPHERD, JR., *Montreal, Oct. 3, 1890.*

We have received the samples in good order, and can vouch for the truth of the statements above made with regard to this apple. The only fault we see in it is its color, which, of course, is a serious one in an apple that is chiefly wanted for dessert purposes.

A WEEPING APPLE TREE.—Mr. Robert Moore, of Zurich, Ont., sends to the Ontario Agricultural College, a photograph of a weeping apple tree, which may possibly take the fancy of some people as an ornamental. We cannot, however, see the advantage of a weeping tree of any kind except for special situations because it is the very hardest form of trees to work into a lawn with other trees; and a tree must have something specially commendable to be desirable as a single specimen in a prominent location. An apple tree would scarcely have enough beauty of foliage to be employed in this way, and therefore we see little in this novelty, except that it is a curiosity. Mr. Moore writes as follows: "I mail you a photograph of weeping apple tree which I raised from seed. It grew among a lot of stocks for grafting purposes. This one showed from the first that it was inclined to be a weeper,

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