

Domestic and Commercial Vegetable Gardening in Dawson City, Yukon Territory, 1980

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ABSTRACT. Canadian subarctic agriculture has not been a widespread practice. Because of increasing northern populations associated with industrial development, and the high cost of fresh produce, the practicality and success of subarctic gardening are examined. Dawson City was chosen for study because of its long history of gardening. In 1980 there were 50 domestic gardens, 56 greenhouses, and three commercial gardens which supplied produce both locally and to Whitehorse and Inuvik.

The study documents the following crops: cabbage, cauliflower, broccoli, Brussels sprouts, carrots, turnips, kohlrabi, radish, beans, peas, potatoes, lettuce, kale, beetroot, Swiss chard, celery, onions, cucumber, tomatoes, zucchini, corn, peppers, leeks, squash, sunflowers and a large variety of herbs. The specific crop varieties used by gardeners are noted along with observations on their relative success, planting and harvesting dates and special gardening practices.

Key words: agriculture, gardening, vegetable cultivation

RÉSUMÉ. L'agriculture dans la région sub-arctique au Canada n'a jamais été une pratique courante. Le présent article examine la praticabilité et le succès du jardinage dans la région sub-arctique, vu la croissance de la population nordique associée au développement industriel et le coût élevé de produits agricoles frais. La ville de Dawson a été choisie pour l'étude en raison de sa longue histoire de jardinage. En 1980, il s'y trouvait 50 jardins domestiques, 56 serres chaudes et trois jardins commerciaux qui fournissaient des produits agricoles à la ville ainsi qu'à Whitehorse et Inuvik.

L'étude documente la croissance des récoltes suivantes: chou, chou-fleur, broccoli, chou de Bruxelles, carottes, navet, chou-rave, radis, fèves, pois, pommes de terre, laitue, chou frisé, betterave, bette, céleri, oignons, concombre, tomate, courgette, maïs, piments, poireaux, courge, tournesols et un large éventail de fines herbes. Les variétés particulières de récoltes employées par les jardiniers sont notées, ainsi que des observations sur leur succès, les dates d'ensemencement et de récolte et les pratiques spéciales de jardinage.

Mots clés: agriculture, jardinage, culture de légumes

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INTRODUCTION

Agriculture, traditionally not a northern phenomenon, has nevertheless been successful in the north. Through the Agricultural Experiment Station in Fairbanks, Alaska, vegetable type, variety, pest and frost resistance and suitability for harsh settings have been tested and storage, marketing and consumer preferences have been analyzed and recorded (Logsdon, 1967). Various levels of controlled environments for vegetable production have successfully increased production (Dinkle *et al.*, 1973). Greenhouse designs and polyethylene mulches (Dinkle, 1969, 1973) and waste-heat utilization methods (The University of Alaska, 1978; The Inco Metal Company Mine, 1977), have proved feasible methods of increasing vegetable yields in northern settings. In addition, a community agricultural program was instigated in 1976 on Alaska's Kenai Peninsula to expand the food supply and to provide local employment (Lewis, 1978).

Canadian northern agricultural research has been conducted at Churchill, Manitoba and Fort Simpson, Aklavik and Inuvik in the Northwest Territories (Hunt, 1978; Loughton, 1976; Nowasad, 1963). In the Yukon, in 1915, a 146-ha farm was operated at New Rampart approximately 48 km downstream from Old Crow. Experimental stations were operated at Swede Creek near Dawson City from 1917-1925 and at Haines Junction from 1945-1968. These stations conducted successful experiments with animals, forage, cereal crops, vegetables and flowers. In 1920,

farming operations were carried out near the mouth of the Pelly River, at Pelly Farm in the Dawson and Mayo areas and at Carcross (Environment Canada, 1979).

In 1959 the Canadian Department of Agriculture estimated the Yukon's potential arable land, confined mainly to the river valleys, to be 118 982 ha. Of this total, the Dawson area comprised 2428 ha. In 1962, the federal government appointed a committee to study the potential for agriculture development in the Yukon (Environment Canada, 1979). This committee concluded that farming, as a full-time commercial operation, had little chance of success, then or in the future. Gardeners in the Dawson City area would strongly argue this point.

With growing population pressures on the north as industrial activities increase, and the high cost of southern produce (Koring [1979] found that Dawson's food prices exceeded those of Edmonton by 64%) which must be flown in to isolated communities, gardening seems a desirable alternative to the supermarket. We undertook this investigation to determine the extent and success of domestic and commercial northern gardening, and to document the crop varieties used by local gardeners. Dawson City was chosen because of its long history of gardening dating back to the Klondike Gold Rush days. We hope that our findings will encourage newcomers and old-timers alike to begin gardening with the full knowledge that success is possible and the benefits are economic as well as psychological.

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Dawson City is located at the confluence of the Klondike and Yukon rivers (64°N, 139 25' W). The town is 528 km northwest of Whitehorse, 96 km east of the Alaska-Yukon border and 1840 air km from Edmonton. The town is built on a floodplain of sand and gravel, approximately 335 m above sea level. The major portion of the townsite is flat, with moderate slopes in the western section running from the north to the south boundaries of the residential area. There are several low-lying areas which suffer from poor drainage, especially in the northern and central sections of the community (Jeffares, 1977). Dawson City is bounded by sharply rising cliffs which reduce the amount of summer sunlight.

Climate is one of the major determinants of northern growing conditions. There must be sufficient heat available to germinate the seed and promote growth. Adequate water, sunshine and frost-free days are also necessary elements to ensure rapid growth and to bring the crops to maturity. Dawson's climate is continental subarctic with short summers, long winters and intermittent spring and fall seasons (Lotz, 1965). The average July temperature is 15.6 C, the average precipitation is 37.4 cm, and the mean snowfall is 136.4 cm (in 1970). The ice-free period on the Yukon River at Dawson is 9 May-23 October (Duerden, 1971). The climatic requirements for crop production in the north, as suggested by Jeffares (1977), are shown in Table 1. Jeffares's information clearly demonstrates that gardeners in the Dawson area should have successful gardens, particularly when the natural precipitation is supplemented by some form of irrigation.

TABLE 1. Climate criteria for crop production

	Frost-Free Days	Vegetative Period	Degree Days	Precipitation During Season
Necessary	80	110	1000	8 - 10 in.
Dawson (1975)	119	136	1636	7 - 10 in.

Source: Jeffares, 1977

Permafrost presents unique problems for northern farmers, for despite warm air in the spring, cold soils will damage plant roots, slow seed germination and subsequent growth, and cause some crops to bolt. Techniques such as terracing, garden orientation, hot bed design and cold frames will improve production (Heming, 1976). Dawson City is located in the northern section of the discontinuous permafrost zone (Geological Survey of Canada, 1967). The permafrost layer ranges from close to the ground surface to a depth of 66.6 m in most areas of the town, with the exception of the south end where the Klondike River has deposited sand for a distance of 200 m (Brown, 1970).

METHODS

In June 1980 questionnaires were distributed to houses in Dawson City where gardens were present. The ques-

tionnaires requested information on type of crop, varieties planted, date of sowing, germination, first harvest, type of fertilizer used and any special techniques which the gardeners had found successful in the Dawson area.

In the latter half of August we returned to Dawson and interviewed a number of the gardeners, collected the questionnaires, and photographed and observed the crops.

RESULTS AND DISCUSSION

The Dawson area's conditions are ideal for vegetable production. The short growing season, with long day-length (19 hours in June), cool soil temperatures and fertile soil produced impressive results. Cabbages of 22.7 kg with diameters of 51 cm, and cauliflowers 41 cm in diameter are not unknown to the area.

There were approximately 50 gardens and 56 hothouses in Dawson during the summer of 1980. In addition there were several gardens outside the town limits and along the rivers and creeks. Three commercial gardens were operated in the area by George and Joan Kerr, Grant Dowdell and Zarephath Farms. These producers supply local needs, either by selling directly to consumers or indirectly through a produce market owned and operated by the Kerrs, and through the local store, restaurants and hotels. Vegetables were also supplied to areas outside the immediate vicinity. For example, Zarephath Farms shipped 1200 pounds of cabbage to Kelly Douglas distributors in Whitehorse, and the Kerrs regularly sell a variety of vegetables as far afield as Inuvik. With the extension of the Dempster Highway some transportation constraints have been relieved, but this factor remains a significant deterrent to large-scale commercial operations.

TABLE 2. Selected vegetable price comparisons in August 1980

	PRODUCE MARKET (Local Produce)	LOCAL STORE (Imported Produce)
Head Lettuce	\$.75	\$1.19
Romaine Lettuce	1.10	1.29
Cucumbers	.75	1.09
Cabbage	.40/lb	.69/lb
Beets	.75/lb	.69/lb (local)
Carrots	1.15/2 lbs	2.49/3 lbs
Zucchini	.75/lb	.89/lb
Turnips	.60/lb	.79/lb

The Kerrs, after their first year of operation, indicated that their market garden and vegetable store were economically viable, and they plan to continue the operation for the foreseeable future. As shown in Table 2, they were able substantially to undersell one of the local stores, which imported most of its produce, and still be satisfied that they were making a reasonable profit. Even more

substantial price savings could be realized by at-farm purchasing. The Kerrs have experimented with different seeds to improve their productivity. This year they tried non-hybrid seeds but these were not as successful as hybrid crosses for most crops. Concern was expressed about hybrids and the impending seed patent laws which may affect their price, quality and availability.

Three local gardeners who have been gardening in the north for 15-30 years feel that "almost any vegetable variety will grow if you have the experience and time to devote to your garden." Although these claims are a bit bold, their gardens were ample proof that they were having notable success with their attempts. All of the 16 gardeners interviewed felt that the activity was hard work but only 12% felt that the effort was not worth it. There were variations in the success of certain vegetables in different gardens; however, these differences may have been due to variety selection, micro-climates, the amount of time devoted to gardening, the use of fertilizer and/or compost, or the use of straw or plastic mulches.

Since many vegetable varieties have been developed for growing seasons with warmer soils, they may not be particularly successful in the north. Biennial vegetables, such as some members of the cabbage family, frequently bolt to seed before the desired growth has been reached (Dinkle *et al.*, 1976). Plants can manufacture food material for much of the 18 hours of sunlight thus accelerating growth. For adapted varieties, the growing season in terms of amount of sunlight may be longer than in southern latitudes. Variety selection is therefore important to ensure that the plants can take advantage of the extended sunlight.

Day-length will influence the annual vegetables such as peas, beans, peppers, tomatoes and members of the cucurbit family (Dinkle *et al.*, 1976). These annuals develop flowers to produce their fruit. Since the time of flowering is often controlled by day-length, attention must be carefully paid to planting and flowering times to ensure that these dates coincide with the light and temperature requirements of the crop. Variety selection is critical to match these needs with the external conditions to secure a favourable crop. The combined features of the growing season in the Dawson City area, however, allow a large number of vegetable varieties to grow successfully. Our findings on crops and varieties used in Dawson during the summer of 1980 are presented below.

Cabbage

Cabbages of 22.7 kg are not unknown to the north. Southern crops are planted to mature in cold weather (Nowasad, 1958, 1963). Successful early varieties were: Copenhagen Market, Golden Acre, Early Jersey Wakefield, Danish Ball Head, Green Ball, Baby Head and Red Meteor. Southern varieties usually require a five-month or longer growing period; 7-8 weeks from transplants. Most early varieties grown in Dawson in 1980 matured over a 92-107-day growing period; 7-9 weeks from transplants.

Emerald Ball Head, a winter variety, was also grown, but too long a growing season was required; the heads did not firm up or were too small.

Golden Acre cabbage planted from seeds directly to the ground on 24 May did not grow. The cool soil in some cases slowed or prevented the seed germination. The location of this garden allowed only for the afternoon sun, which would significantly influence its productivity. Most of the cabbage varieties grown were germinated indoors in mid-April.

Cauliflower

Cauliflower is a cool-weather crop and is fairly frost-hardy (Dearborn, 1975). Three Snowball varieties were widely used: Early Snowball, Snowball A and Early Abundance Snowball #6. Southern conditions require 60-80 growing days from transplants. Cauliflower in the Dawson area matured over 110-115 days; nine weeks from transplants. In most cases the harvest was at the beginning of August. Super X Snowball and hybrids like Snow Crown bolted to seed too early. Possibly the bolting characteristics of these varieties were induced prior to outplanting as a result of improper culturing.



FIG. 1. King Robert Purple broccoli.

Broccoli

Broccoli is a frost-hardy, cool-weather crop. Its optimum temperature is usually 10-20° C; too much heat will force the plant to flower (Dinkle *et al.*, 1976). Four popular varieties were grown successfully: Cleopatra, which was considered the best and produced good shoots; King Robert Purple (Fig. 1), which was smaller than the hybrids but produced good tight heads; Spartan Early and Italian Green Sprouting. Green Comet Hybrid was also grown, but the results were not favourable. The successful varieties grew over an 85-day growing period; 8-10 weeks from transplants with the first harvest in mid- to late July.

Brussels Sprouts

Brussels sprout crop results illustrate that a long growing period of cool weather is required. Jade X Hybrid F is a

heavy producer and can be started early enough for short seasons. This variety was successfully grown (3.8 cm across) over a 10-week period from transplants started indoors in February. Half Dwarf Improved matured over 114 days; nine weeks from transplants. Catskill Improved was productive, but the heads were smaller than those of the hybrids. Many plants had not been harvested 12 weeks after transplants, but fortunately Brussels sprouts are frost-hardy, and frost improves their flavour (Clark, 1978).

Carrots

Carrots produce successful yields in the north since their optimum temperature is cool. Most southern varieties require 65-75 days to grow to full size (Martin *et al.*, 1968). A number of varieties were grown in the Dawson area: Danver Half Long, Royal Chatenay, Ultra Pak Hybrid, Chatenay Red Core, Gold Pak Elite, and More's Improved Chatenay. The carrots grew over a 6-10 week period with the first harvest ranging from the end of July to mid-August. Variable successes resulted in certain gardeners preferring different varieties. Nantes carrots were favoured within



FIG. 2. Early White Vienna kohlrabi.

the town with Gold Pak and Danver preferred to a lesser extent. In the areas upriver from Dawson, Danver and Royal Chatenay were the preferred varieties.

Turnips and Rutabagas

Turnips are cool-season, frost-hardy vegetables which store well. Southern turnips require 45-60 days to mature (Clark, 1978). Laurentian Swede turnips, White Globe and Laurentian Purple Top all matured well over a 60-day growing period in Dawson.

Kohlrabi

Kohlrabi, a cabbage relative that stores as well as turnips, was grown by three gardeners interviewed. The popular varieties were Grand Duke and Early White Vienna (Fig. 2). This vegetable sprouted early, grew rapidly, and matured after eight weeks. The first harvest was 8 August and produced vegetables of 20 cm in diameter.

Radishes

Radishes are frost-hardy and seeds can be sown as early as the soil is workable in two-week intervals until the weather becomes very warm. Cherry Belle, Early Scarlet Globe and Comet radishes did very well and matured over a period of four weeks. One commercial gardener stated that he does not consider radishes a valuable market crop but did not elaborate on his reasons.

Beans

A diverse number of bean varieties grew in the Dawson area. Bush beans usually require 6-7 weeks to mature. Beans are frost-tender and require soil temperatures of 17°C to sprout reliably (Martin *et al.*, 1968). This requirement did not present a problem in the Dawson area and a wide number of varieties were grown easily. These included: Bush Blue Lake, Cherokee Wax, Contender, Early Golden Harvester Green, Honey Gold, Eastern Butterwax, Pure Gold Wax, Black Pencil Pod Wax Beans, Stringless Golden, Imperial Tender Green and Windsor Broad Beans. The last variety did not market well and was not going to be grown commercially the following year.

Pole bean varieties require 10 days to two weeks longer than bush beans to flower (Clark, 1978). The successful varieties included Blue Lake and Kentucky Wonder. Both bush and pole varieties matured in 11-12 weeks. One gardener covered her plants with clear plastic during the early growth stages which greatly improved her success.

Peas

The sweetest garden peas are produced during a long season of cool weather (Clark, 1978). Tall varieties included Green Arrow and Tall Telephone (Fig. 3). This latter variety usually grows to a height of 1.3 m, but for three gardeners, they grew to well over 2.6 m and the unexpected growth resulted in shading of other portions of the gardens. These plants were virtually laden with filled pods; however, one gardener found that her Tall Telephone peas

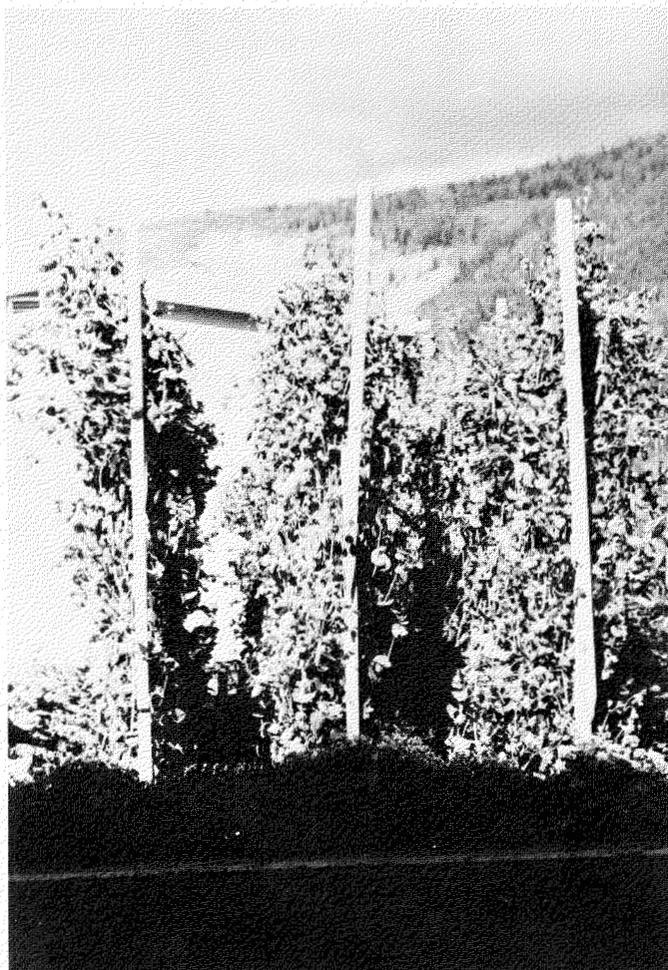


FIG. 3. Tall Telephone peas.

had pod concentrations at the top of the plants which posed harvesting problems. Medium and dwarf varieties included: Alaska, which did not do well in the north end of town — the pods were too short; Homesteader Early dwarf, which was one of the best; Laxton Progress Peas; Morse's Progress #7; Spring Green, which was only marginal; Lincoln Homesteader; and Calevedon Wonder Peas. These varieties flowered after four weeks and produced fruit 3-4 weeks later.

Potatoes

Potatoes thrive in cool, well-drained soils. Norlins are high yielders with smooth skins and store well. Warba, a white potato, Netted Gems, Green Mountain and Alaska 114 (Fig. 4) all did well. The last two varieties are good storing potatoes. These potatoes matured over a 60-80-day growing period with the first harvest at the beginning of August. Many gardeners produced enough to last into the spring. Scabs presented a problem in areas with poor drainage, but the flavour was not affected.

Lettuce

Head lettuce usually requires 80-95 days to mature; leaf lettuce requires 40-45 days (Clark, 1978). The head varie-



FIG. 4. Alaska 114 potatoes.

ties grown were Tom Thumb, which was harvested in mid-July, New York Head, Great Lakes Ithaca Head and Mini Lake. Soft heads of the Mini Lake variety were harvested as early as 29 July. This variety was grown commercially very successfully in greenhouses where it sold for 60 cents a head. The leaf varieties grown were: Black Seeded Simpson, Romain (Cos), Red Salad Bowl and Buttercrunch. These varieties matured over 30 days. One gardener placed jars over his crops. The plants grew until the jars were removed, but the ensuing temperature change was too great for survival.

Kale

Tall Green Kale was commercially grown by one firm but bolted to seed and as a result was unmarketable.

Beetroot

A number of beet varieties were grown successfully: Detroit Dark Red (Fig 5); Ruby Queen, which produced beets 5.1-7.6 cm in diameter; and Formanova, a cylindrical variety which is one of the best marketing crops. All of these plants matured well over nine weeks. One grower sold her beets after five weeks at 2.5-5 cm diameter; beet greens were marketed one week earlier.



FIG. 5. Detroit Dark Red beetroot.

Swiss Chard

Swiss chard, a member of the beet family, was grown with great success. This vegetable is ideal for northern conditions. It continues to bear leaves from spring to late fall and only a series of hard frosts will discourage growth. Lucullus is a high-yield variety and Silver Giant did well over a six-week period.

Celery

Celery, a slow germinating and growing plant, requires a long cool season. As a result, most of the stalks produced in Dawson were small. One gardener placed barrels around Utah celery and hilled them up as they grew. The stalks nonetheless did not grow as large as southern yields. Similar results were found with #638 Giant Prague celery plants started indoors in mid-March; they were transplanted 11 June and harvested during the last week of July. The stalks were 2 cm across.

Onions

White Lisbon onions were sold as green onions after three weeks. Paris Cocktail, Yellow Dutch and Barletta varieties were grown successfully in the area.



FIG. 6. Select Green zucchini.

Cucumbers

Cucumbers prefer warm weather, and most northern varieties are grown indoors in green houses or hothouses (Dinkle *et al.*, 1976). Early Russian were grown over a 12-week period; six weeks from transplants. Other successful varieties were Mincer Pickling, Burpee Hybrid, Green Market Pickling and Early Russian. One gardener starts her seeds indoors during mid-March or in the greenhouse with tomatoes in mid-April.

Zucchini

Select Green Zucchini (Fig. 6) was grown commercially in greenhouses, planted in early April and sold 25 July. Gold Rush Yellow, a square variety, grows well outdoors. Planted 25 April, the seeds germinated in four days, were transplanted 2 June and the first harvest was 1 August. Select Hybrid grows successfully indoors and out; it matures over a six-week period in the greenhouse and an eight-week period outdoors.

Tomatoes

Tomatoes require a great deal of light and predictable warmth to be productive. Many varieties were grown in



FIG. 7. Polar Vee corn.

greenhouses and hothouses. Subarctic Maxi was the best and earliest although one gardener had blight problems; other successful varieties were Cold Set, Beefsteak Later but Choice, Manitoba Beefsteak, Hybrid Patio, Beef Master, Earliana Beefsteak, Cascade, Tiny Tim and Starfire 100. Hybrid Patio and Beefsteak varieties were grown outside but were smaller than those grown indoors. Most varieties were started in mid-April and were harvested in early to mid-August. A commercial gardener in the area grows his tomatoes successfully outdoors. To compensate for the colder conditions and prevent frost damage, he places plastic over the crops at night. The plastic serves as a mulch, raising temperature and conserving moisture (Nowasad, 1963).

Corn

Corn has been tried by a number of gardeners with limited success. Corn requires warm soil (15° - 17°C) (Martin *et al.*, 1968). Polar Vee (Fig. 7) and Amazing Early Alberta were the varieties chosen but the cobs were small and soft with kernels missing. One gardener produced sufficient corn to feed a family of three for two weeks.

Other Crops

Other crops grown to a lesser extent were: Calwonder green peppers; Harris Model parsnips, which did not do well; 733 American Flag leeks, which after nine weeks were still small; Golden Hubbard squash and Spaghetti squash; Russian Large sunflowers; fennel; watercress; chives; parsley; dill; and mint. Other herbs were grown with regional successes.

Fertilizing Techniques

Healthy vegetables depend on rich garden soil, which is attained through various fertilizing practices. Manure was generally felt to be the best fertilizer. One grower layered his garden, placing manure on the bottom, then soil, then the seeds and a final layer of soil. Berle Zaykowski watered her plants with a slurry of manure and water. However, livestock is not abundant in the area and hence there is a manure shortage.

Most town gardeners preferred to grow their vegetables organically. Many hauled topsoil in from the river beds while others used peat moss. Composting was widely practiced.

Commercial fertilizers were used in greenhouses, especially for tomatoes. Growers used various ratios, including Vigro 5-10-10, Vigro 16-20-20, RX Tomato Food 18-18-14; bone meal and fish-based fertilizers were also used.

One commercial grower used fertilizer extensively. A 20-20-20 seaweed base was used with irrigation, 16-16-16 fertilizer was heavily applied to the main garden (2.9 ha) and an 8-24-24 ratio was used on potatoes. Fertilizer applications resulted in higher yields over a shorter growing period. For example, Copenhagen Market cabbage was harvested two weeks earlier here than in other gardens.

Pests

Three pests presented particular problems: Red Turnip beetles (*Entomoscelis americana* Brown), root maggots and cutworms. The Red Turnip beetle is bright red with three black dorsal stripes. The larvae are rough and dark-skinned and feed primarily on members of the cabbage family. After several weeks of feeding the beetle retreats into aestivation but reappears in a few weeks and continues feeding until late August or until an extreme frost occurs. The beetle attacked beet greens, radishes, cauliflower and cabbage. Cutworms destroyed 10 out of 16 cabbages in one garden and 12 out of 15 broccoli plants in another. The effects of these pests were seen only in some of the gardens.

Both pests can be controlled through the application of Diazinon or Malathion insecticides. Diazinon Lawn and Garden insecticide was widely used. Soapy water, moth balls and companion planting techniques were also used in insect control.

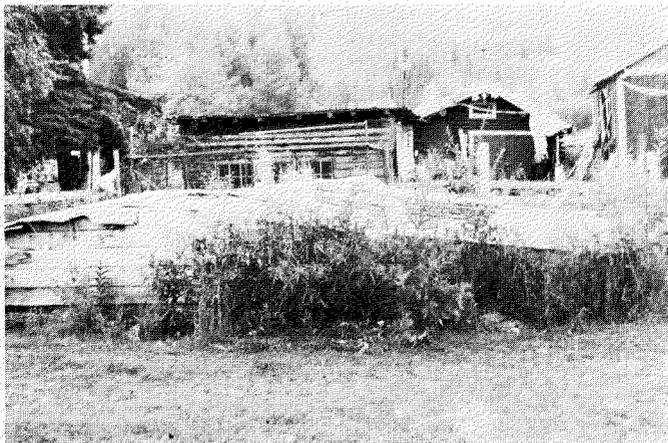


FIG. 8. Root house.

CONCLUSION

Gardening in the Dawson area has every chance of success. Historically, a large population was supported from the fruits of the land. Today, however, the small population (800) cannot support a large commercial operation unless transportation networks are improved, allowing wider shipment of locally-grown produce.

The gardeners who have been in the area for many years feel that there are fewer gardens every year. They attribute this to laziness, to the demands of a wage economy, and to the lack of adequate storage facilities (Fig. 8) such as freezers, root cellars and basements that do not flood or freeze. In addition, the old-timers say that modern consumerism has changed us. Residents are accepting high prices and elaborate packaging as a fact of life.

Nonetheless, gardening in the Dawson area is not a dying art. Information and gardening tips flow easily throughout the town. Vegetable growers on the whole feel that the activity is more a hobby than a chore, with the benefits of fresher produce and a reduced food bill. Three of the gardeners interviewed also hunt in the winter. The two activities combined have rendered them virtually self-sufficient. Many give vegetables to their friends who reciprocate with other goods, creating an informal barter system. Mike Seniszuk explained why he enjoys the activity: "Hell, who cares about prices? I like to see things grow." Ma Telep offered another perspective: "We may or may not save money but we sure eat better." The words of these two gardeners sum up the success of vegetable production in Dawson City. The land will produce, and produce well.

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REFERENCES

- BROWN, R.J. 1970. Permafrost in Canada: Its Influence on Northern Development. Toronto: University of Toronto Press. 234 p.
- CLARK, D.E. (ed.). 1978. Vegetable gardening. Menlo Park, CA: Lane Publishing Company. 60 p.
- DEARBORN, C.H. 1975. Production tips: cauliflower, Swiss chard, beet, spinach, cucumber, potato, summer squash. *Agroborealis* 7(1): 24-27.
- DINKLE, D.H. 1969. Warm season vegetables thrive on polyethylene insulated soils. *Agroborealis* 5(1):16-19.
- _____, BURTON, W.E. and OSLUND, C.R. 1973. Controlled environment agriculture (C.E.A.). *Agroborealis* 5(1):6-8.
- DINKLE, D.H., GRINZTON, L.M. and LURA, M. 1976. Vegetable variety trials. *Agroborealis* 8(1):20-22.
- DUERDEN, F. 1971. The evolution and nature of contemporary settlement pattern in selected areas of the Yukon. Centre for Settlement Studies, University of Manitoba. 245 p.
- ENVIRONMENT CANADA. 1979. Land use programs in Canada: Yukon Territory. Ottawa: Department of Supply and Services. 296 p.
- _____. 1975. Summary of sunshine records for June and December 1975. Monthly Meteorological Observations. 44 p.
- _____. WATER RESOURCES BRANCH. 1979. Yukon River Basin report. Ottawa: Department of Supply and Services. 94 p.
- GEOLOGICAL SURVEY OF CANADA. 1967. Permafrost in Canada. Map 124 6A. Ottawa.
- HEMING, R. 1976. What chance for farmers in the Northwest Territories? *North/Nord* 23(4):30-31.
- HUNT, L. 1978. Farming in the Territories — is success to be based on climate or economics? *North/Nord* 25(1):20-23.
- JEFFARES, C. 1977. Dawson City, Yukon Territory: An evaluation of factors contributing to its renewed vitality. Unpublished M.A. thesis, University of Alberta, Edmonton.
- KORING, P. 1979. The Yukon: a dream province. *Maclean's* 93(55): 37-41.
- LEWIS, C.E. 1978. Crisp green salad at forty below. *Agroborealis* 10(1):26-30.
- LOGSDON, C.E. 1967. Vegetables in Alaska: current demand indicates market for three million dollar farming industry. *Agroborealis* 1(2): 7-10.
- LOUGTON, R.E. 1976. Vegetables growing in peat under protection in Churchill, Manitoba. Report of the Northern Studies Committee, University of Manitoba. 35 p.
- LOTZ, P. 1965. The Dawson Area: A Regional Monograph. Northern Coordination and Research. Department of Indian Affairs and Northern Development. 209 p.
- MARTIN, J.H. and LEONARD, W.H. 1968. Principles of Field Crop Production. 2nd ed. New York: The Macmillan Company. 1044 p.
- NOWOSAD, F.S. 1963. Growing vegetables on permafrost. *North/Nord* 10(4):42-45.
- _____. 1958. Agriculture research in subarctic and arctic Canada. *Canadian Geographical Journal* 57(3):100-103.