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*Here is a good 1-year-old planting
of Latham Raspberries.*



growing raspberries *in south dakota*

For the best insurance against winter-killing in a raspberry planting (1) select only hardy varieties; (2) set the plants on fertile, well drained soil, possibly with some natural protection; (3) protect the plants from extremes of temperature, both low and high, during the winter; and (4) provide irrigation during the growing season. By these means, a satisfactory crop will generally be produced.

Growing Raspberries in South Dakota

HARRY E. LASN and S. A. McCRORY¹

This publication is designed to assist raspberry growers obtain better yields from raspberry plantings. Winter injury is the most common limiting factor in raspberry growing. Because of the complex nature of the conditions associated with winter injury, a study was designed to evaluate management practices in South Dakota. Preliminary evaluation of some of the more generally planted varieties was made and a comparison of different cultural practices provides the source of information reported. Much information gained from other studies has been used extensively in this report.

DEVELOPMENT OF VARIETIES

The red raspberry (*Rubus strigosus*) is native to America and can be found growing as wild plants in most of the northern part of the United States. These plants provide some of the most winter hardy raspberries. Another species (*R. idaeus*) was introduced from Europe. These two species have been hybridized extensively to provide most of our varieties of red raspberries.

The black raspberry (*R. occidentalis*), also found growing wild in

many parts of the United States and Canada, is generally less winter hardy. Varieties of black raspberries are less numerous than the red and few are able to grow well in South Dakota.

The greatest difference between the red and black raspberries is in growth habit. Because of this, different culture treatments are necessary. Black raspberries produce new canes from the crown only and will remain in the original row. Red raspberries produce suckers from both crown and roots and spread over considerable area. The purple raspberry (*R. neglectus*) is a hybrid between red and black varieties and is somewhat similar to both species. In growth habits it is more nearly like the black.

All raspberry varieties produce fruit on the canes of the past season's growth. Minor exceptions are the everbearing and the varieties that produce a little fruit on young canes in the late summer. That is to say they have a biennial top with perennial roots. With this growth habit the fruiting cane is always subject to winter hazards. Further-

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more, the raspberry plant will continue to grow as long as the temperature will permit and seldom forms a terminal bud. For that reason the tips of the canes are killed almost every winter. When this injury extends more than a few inches the yield is reduced.

VARIETAL DESCRIPTIONS

A few hundred raspberry varieties have been named and grown at some time in America. A brief description of those that have been grown and evaluated in recent years at the South Dakota Experiment Station follows. The approximate maturity dates are shown in table 1.

Red Varieties

Chief. (Minnesota Fruit Breeding Farm)² Its greatest merit may be winter hardiness but winter killing was only slightly less than that

suffered by Latham, from which it was selected. It produces a good number of new canes of medium height, which stand erect and are vigorous. The fruit is of medium size with a light red color and is of fair quality. It has not produced as well as many other varieties.

Indian Summer. (New York Agricultural Experiment Station, Geneva) It appears to lack the hardiness necessary to tolerate winter conditions without injury. New canes are produced in abundance but the plants sometimes lack vigor. The fruit ripens early, is dark red, and has excellent flavor. It will also produce a fall crop but at Brookings the season is too short for the fruit to ripen. There are better varieties for this area.

Latham. (Minnesota Fruit Breeding Farm) It is planted more in this area than all other varieties. It is winter hardy, produces plenty of good canes, and will produce better under adverse conditions than most varieties. Plants grow to a height of 5 to 6 feet and frequently benefit from supporting structures because of the slender canes. The fruit is large, dark red, and fairly firm. The quality is fair. This is, no doubt, one of the best varieties for this area.

Madawaska. (Ottawa, Canada, Experiment Station) The plants are short but stand erect in spite of their small size. The variety lacks the hardiness desired but has shown enough hardiness to encourage its planting. It ripens 10 days to 2

Table 1. Approximate Maturity Dates for Raspberries at Brookings

July	Variety
15—	Madawaska
16	
17	
18—	Chief, Trent, John Robertson*
19	
20—	Cumberland*, Indian Summer, Viking
21	
22	
23	
24	
25—	Newburgh, Black Hawk*
26	
27	
28—	Milton, Ottawa
29	
30—	Latham, Taylor, Sodus

*Black Raspberry

²Variety developed at location in parentheses.

weeks before Latham and in addition will generally produce some fruit on the new canes in the fall. The fruit is large, of fair quality, but inclined to crumble. Because of its ripening date this variety, when combined with Latham, will provide fruit over a long period.

Milton. (New York Agricultural Experiment Station, Geneva) The sturdy canes stand erect without support but lack the winter hardiness desired. The fruit is large and, except for the light red color, is attractive. Most of the fruit was damaged by sun scald during hot sunny days. It does not appear to be at home in the Great Plains.

Newburgh. (New York Agricultural Experiment Station, Geneva) The plant first appeared to be reasonably winter hardy but later showed severe winter killing. The low growing plant branches freely and may produce much immature wood in the fall. The fruit is the largest of all varieties tested. The large berries are firm, of good quality, and attractive. Unless winter damaged, it appears to be one of the best producers. It is worth trying as a mid-season variety.

Ottawa. (Ottawa, Canada, Experiment Station) The plant is large but subject to virus diseases. The fruit is large, attractive, and of fair quality. Plants were severely winter damaged. This variety does not offer much promise for this area.

Taylor. (New York Agricultural Experiment Station, Geneva) The large, sturdy, upright plants do not

require support. It showed a fair degree of hardiness. The large, bright red fruit is produced in abundance. During the period of testing this variety showed evidence of mosaic, a disease reported to be common in this variety. For that reason Taylor may never be extensively planted.

Trent. (Ottawa, Canada, Experiment Station) The variety appears to be poorly adapted to this area. The plants have shown severe winter damage and the fruit characteristics are not outstanding.

Viking. (Ottawa, Canada Experiment Station) The plants are extremely large and vigorous. Because of the rigidity of stem it is difficult to bend the canes for covering. Winter injury was severe on immature canes. The variety is reported to be subject to mosaic. The fruit is large, bright red, and of good quality. The firmness of the fruit has suggested its use for freezing. This mid-season variety may have some value for growing in protected areas.

Black Varieties

Black Hawk. (Iowa Agricultural Experiment Station) The canes are strong and vigorous and have been reasonably hardy at Brookings. The fruit is large and has little tendency to crumble. The fruit is produced in tight clusters making picking a little difficult. Because of fruit quality and hardiness of plant, this variety is worthy of planting in South Dakota.

Cumberland. (One of the old varieties) At Brookings it grows too poorly to warrant recommending it for trial.

John Robertson. (A selection from a chance seedling found near Hot Springs, South Dakota, by the late John Robertson) When grown at Brookings it has shown enough hardiness to recommend its use for home or commercial planting. It is a good producer with large, glossy, attractive fruit. The fruit is firm and of good quality. It ranks among the best black varieties for this area.

Purple Varieties

Ruddy. (North Dakota Agricultural Experiment Station) The plant produces from suckers the same as red varieties. Plants showed a degree of winter killing on terminal growth. The fruit is a reddish purple color, small, and very soft. There appears to be little merit in planting this variety.

Sodus. (New York Agricultural Experiment Station, Geneva) The large vigorous canes grow as high as 10 feet. Winter injury was always severe and covering is essential if good yields are to be expected. The fruit is large and of good quality. Although this is one of the best purple varieties, it cannot be recommended for planting in South Dakota.

WHY RASPBERRY CANES WINTER KILL

The so-called hardiness of a variety is associated with its inherent ability to tolerate cold temperatures. In selecting a variety to be grown in any locality, careful consideration must be given to the reaction to normal winter temperatures. The test of time has proven that Latham is one of the best red varieties for this

area. John Robertson and Black Hawk have demonstrated a sufficient degree of hardiness to justify growing them in South Dakota.

Immaturity of wood is frequently a cause of cane killing by the first freeze in the fall. A warm autumn followed by a sudden freeze may kill canes before they are properly hardened. Cane maturity may also be influenced by insect or disease attacks, late cultivation and favorable fall growing conditions.

During winter it may often happen that canes lose moisture beyond the point of recovery. When the soil moisture content is low or when the ground freezes, the root intake may not be great enough to prevent desiccation. Exposure to winter wind may increase this injury.

Fluctuation in winter temperature may cause great variation in the extent of winter injury from one year to the next. As an example, the winter of 1957-58 was very mild at Brookings, but injury to unprotected Latham raspberry canes was severe. Winters that have been continuously cold have frequently caused little injury to the same planting.

If all of these conditions could be prevented there is little doubt that winter injury to raspberry canes could be greatly reduced. A planting made in 1953 has been maintained in such a way as to provide (1) protection by covering, (2) winter shading,³ and (3) ample moisture

³This treatment was started on plots that were originally designed for fertilizer treatment but abandoned after two seasons.

Table 2. Daily Temperatures at Brookings, 1958*

	February							March										
	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11
Maximum	55	69	63	61	57	45	39	28	27	29	35	30	35	33	31	28	28	38
Minimum	6	23	27	25	39	37	2	15	15	20	19	20	13	22	26	23	15	9

*Source: U. S. Weather Bureau, Huron, South Dakota.

during the growing season. Results of the first 3 years were reported in South Dakota Experiment Station Circular 127.

During the winter of 1957-58 much winter killing of canes was experienced. Temperatures during the last week of February were much above normal (see table 2). During the early part of March the temperatures dropped and remained below freezing most of the time with a minimum of 9° F. on March 11. The warm weather of February was warm enough and probably of long enough duration to break the rest period and initiate early stages of growth. The cold weather immediately following was severe enough to cause injury to canes not well hardened.

As shown in table 3, irrigation had offered encouraging results in previous years. However, the 1955-56 and 1957-58 losses were greater when plants were irrigated than for any other treatment.

The raspberry canes that had their tips covered have consistently shown the least winter injury. Without doubt, loss could be further lessened if the entire plant were covered. Some benefit may be expected from shading or by irrigating. However, there are conditions where such treatments will not provide adequate protection. It, therefore, ap-

pears that covering is the only dependable winter protection.

RASPBERRY YIELDS

The winter injury to Latham raspberry canes was so severe during 1957-58 that yields were not considered valid information. Therefore, the yields for that year are not included in table 4. However, it should be stated that no treatment produced a quantity of fruit great enough to be considered. Even the canes with the top 1/3 covered with soil were severely damaged. The exposed portion that was able to survive previous winter conditions was severely damaged.

Winter injury can be reduced by covering the top one-third of the canes.



Table 3. Weight of Winter-Killed Canes of Latham Raspberries (in ounces) for 4 Years as Influenced by Treatment and Location in Plot

Location in Plot*	Covered				Irrigated				Fertilized		Shaded		Check			
	1955†	1956†	1957	1958†	1955	1956	1957	1958	1955	1956	1957	1958	1955	1956	1957	1958
Row 1	1	4	7	10	3	6	9	29	8	6	10	17	9	4	13	19
Row 2	8	1	5	6	2	8	8	28	19	6	9	10	16	5	11	18
Row 3	8	2	4	9	10	8	6	21	31	10	14	16	16	6	7	9
Row 4	9	2	7	10	17	13	8	19	30	9	7	13	20	6	6	10
Total Kill																
Per Year	26	9	23	35	32	35	31	97	88	31	40	56	61	21	37	56
Total Kill																
Per Treatment	93				195				119		96		175			
Average Kill																
Per Treatment	23.25				48.75				59.5		48		43.75			

*Diagram of test plot shown in figure 1.
 †Winter-kill significantly lower than check.

This suggests that for dependable winter protection, the entire cane should be covered with soil. The large fruit size, reported earlier, was responsible for greater yield in plots receiving supplemental moisture. During the early part of this study

it appears that some benefit resulted from a winter shade cast over the

Average weight in ounces of winter-killed Latham Raspberry canes in various treatments.

Shading during winter may help prevent the canes from breaking the rest period.

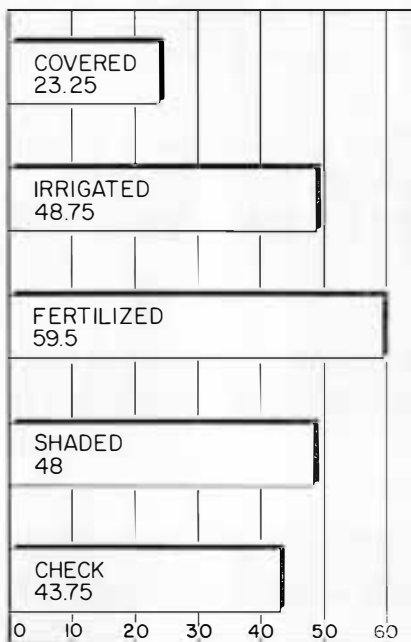


Table 4. Latham Raspberry Yields (in pints) by Year and Treatment

Location of Plot	Fertilized*			Irrigated			Covered			Check		
	1955	1956	1957	1955	1956	1957	1955	1956	1957	1955	1956	1957
Row 1	6	2¼	5⅓	12	3	9¼	12	3¼	4¾	9	2⅛	3
Row 2	7	3¼	5	24	4½	12½	23	3½	8⅔	14	4	9¾
Row 3	12	1½	6	25	3	12½	25	4⅔	9⅓	17	3¼	6
Row 4	19	1⅓	7⅔	18	2¾	11¼	23	4¼	8⅔	24	1½	5¾
Total	44	8½	24⅓	79	13¼	45½	83	15⅔	31½	64	10⅞	24½
Total for 3 Years	76⅔			137¾			130⅙			99⅔		

*6-10-4 fertilizer used.

one row of this planting. A shading device used in a randomized arrangement during the winter of 1956-57 and 1957-58 failed to show beneficial results. Thus it appears that shading and irrigation are not dependable means of protecting raspberry canes against winter conditions.

There are many problems associated with raspberry growing not covered in this study. Some are not fully understood. However, with the

information available the raspberry producer can lessen the hazards of winter by following the best known practices. Select only the so-called hardy varieties, set the plants on fertile, well-drained soil, possibly with some natural protection. Protect the plants from extremes of temperature, both low and high, during the winter. Provide irrigation during the growing season. By these means a satisfactory crop will generally be produced.

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Figure 1. Layout of plots for the experiment.

