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# SUPPLEMENTARY FORAGE CROPS

for the Maritime Provinces

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## **GETTING THE MOST FROM ANNUAL FORAGE CROPS**

A complete forage program should include both annual and perennial forage crops to suit the particular feed requirements of the farm. Select annual crops to fill gaps in the production of perennial forage crops. Use annuals for early spring, late summer or late fall crops when production from perennial crops is limited.

These crops require a good seedbed, good seed and adequate fertilization, either as manure, commercial fertilizer or both. Seed at the best time for maximum utilization, which means early spring, early summer or early fall, depending on the crop and when feed is required. These crops should be harvested at the proper stage of maturity for best production and best use.

Getting the most from annual forage crops requires a thorough knowledge of the value of the different annual forage crops and how they can be combined in a complete forage program. The aftermath from perennial forages should not be neglected.



# SUPPLEMENTARY FORAGE CROPS

## for the Maritime Provinces

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Annual crops for supplementary hay or pasture play an important part in many forage programs in Canada. The acreage of annual forages grown in the Atlantic Provinces varies from year to year, but is much greater than it was some years ago. Annuals often provide extra forage when it is needed most to replace other crops killed by hard winters or drought. Many annuals yield over two tons of dry matter per acre. Some of them are ready for grazing as early as six weeks after seeding. They can be grazed up to four weeks earlier than regular pasture, and four or more weeks later in the fall.

Selection of annual crop depends on feed requirements and cost of production. There are a great many crops to choose from. Some annuals are suitable for hay; some are better for pasture in early spring or late



Figure 1. General view of supplementary forage trials at Nappan, showing crops seeded in rows 7 inches apart in the foreground and 36 inches apart in the background.

fall; and some make good silage or green feed. The type of livestock on the farm and the time of year feed is needed also affect choice of crop. Another important consideration is the cost of seed relative to the cost of sowing and managing each crop.

Many annuals give better forage yields and are simpler and cheaper to grow when seeded alone rather than in mixtures. It is usually more efficient to grow a small acreage of each of two or three crops than to combine them. For best results, annual crops should be fertilized. Recommended formulas and rates for fertilization may be found in fertilizer guides issued by the provincial departments of agriculture.

The information given in this publication should help you select the best crops for your particular needs. It is based on actual growing experience with various annuals grown singly and in mixtures at Nappan Experimental Farm in Nova Scotia. The tables on pages 14 to 15 summarize the results of the Nappan trials.

## SINGLE CROPS

### Corn

Corn is probably the most widely grown annual forage crop in Canada. In many areas it is the principal grain crop on the farm and also provides supplementary forage. Corn makes good green chop, ordinary silage, and high-moisture grain silage. The development in recent years of new hybrids with improved adaptation to a variety of soils has made successful corn growing possible on a much larger area than formerly.

Early seeding is important. In the Atlantic Provinces you should seed corn as early as the ground can be worked. Good crops, seeded early, produce more than 5 tons of dry matter per acre. If you seed corn in mid-June or later, you can expect only 1½ to 2 tons of dry matter per acre. Seeding rate depends on the method of seeding. With most grain drills, 1 bushel or more per acre is required for uniform seeding. If you use a corn planter, 10 to 15 pounds per acre is adequate. Seed costs are no higher than for most annual crops, but corn needs more fertilizer. Also, special equipment for planting, cultivating, controlling weeds and harvesting adds to the cost of production.

For more information about growing corn, see Publication 1025, *Growing Corn*, available from the Information Division, Canada Department of Agriculture, Ottawa.

### Oats

Oats is one of the cheapest and best annual forage crops. At Nappan, oats is regularly among the top yielding and most dependable crops. It is excellent for supplementary grazing, can be used for green chop, and produces a good hay crop if harvested in the milk stage. You can seed



oats as late as mid-September. It can be grazed in the spring, summer or fall. Grazing can start as early as six weeks after seeding. Grazing before the boot stage of development permits some regrowth. Little or no grain can be expected after grazing. When oats is used as a companion crop with perennial forages, grazing must be controlled, as excessive trampling and overgrazing will damage the forage crop.

Seed is readily available, and most varieties recommended for grain also produce satisfactory forage yields. Fertilizer requirements for forage are the same as for grain. Nitrogen improves the production of aftermath and the growth of tillers. No special seeding or harvesting equipment is necessary. Seeding rate for forage is 2 to 3 bushels per acre.

### **Barley and Wheat**

These crops are not so productive as oats. They are more subject to disease and more difficult to grow. Also, they require better drained soil and more fertilizer. The awns on barley and the beards on wheat make them less palatable as hay.

### **Millet**

Millet is usually considered a warm-weather crop but it is also suitable for hay and for limited grazing in the Atlantic Provinces. It must have adequate soil moisture. Millet is not so palatable as some other supplementary forages. It is not a dependable crop as yields vary greatly from year to year.

Seeding costs are somewhat higher than for oats. You may seed the crop with a grain drill. Seeding at 25 to 30 pounds per acre between mid-June and early July has been found satisfactory.

Regrowth is slow when the crop is used for pasture. Japanese millet is more productive than Hungarian millet and recovers better after harvesting. You should cut millet for hay when it has just headed out.

### **Peas**

Some years ago peas were popular for forage. They were grown alone and in mixtures with oats especially for this purpose. Now most peas are used for canning and are available for forage only as a by-product of the canning industry. They are not so easy to grow as oats and their yield is less reliable. The Chancellor variety, which generally produces more than 1 ton of dry matter per acre, can be used for green chop or silage. Peas are not suitable for pasture. Weeds, insects and diseases such as mildew can be troublesome. Frequent cutting is not desirable as little recovery occurs.

Peas are usually seeded before the end of June. Seeding at 1 bushel per acre with a grain drill is recommended.

## Rape

This is a rapid-growing crop that is suitable for green chop or pasture. Rape's greatest value lies in its ability to withstand early frost. Rape seeded in late June or early July is ready for use as early as mid-August, and it continues to grow well into November, providing late fall grazing. Cabbage maggot and other insects can be destructive to rape. Careful use of a recommended insecticide will control these pests. The growth looks very coarse, but is relished by livestock. Rape is more suitable for beef cattle and hogs than for dairy cattle. It is not recommended for milking cows as it may give an off-flavor to the milk.

Seed is usually sown in rows 24 to 36 inches apart for mechanical harvesting or grazing, but it may also be broadcast. An electric fence is useful to control grazing of crops sown by either method. The advantages of growing rape in rows include higher production and easier harvesting, although when seed is broadcast weeds are less troublesome. For row seeding, a rate of 2 pounds per acre is recommended. At Nappan, yields were about equal for seed broadcast at rates of 2, 3, 4 or 5 pounds per acre. Weed control is best at 5 pounds per acre, and even at this rate seed costs are not high. Dwarf Essex, Garton's Early Giant and English Broad-leaf varieties produce about equal yields of forage.



Figure 2. Kale and rape grown from broadcast seed.





Figure 3. Rape and kale plants ready for early grazing. Rape leaf stems all join the stem at the base, whereas kale leaf stems join alternately up the main stem.

### Kale

Kale resembles rape in appearance and use. It is suitable for green chop or pasture, but is generally not so productive as rape and recovers less well after harvesting. You can broadcast kale or sow it in rows 24 to 36 inches apart. Row seeding gives greater production but necessitates cultivation. Kale is ready for harvesting as early as August, and it continues to grow well into November. Kale stems are coarser than those of rape, but they are less numerous and more succulent. The cabbage maggot and some other insects can be as destructive to kale as to rape. Timely spraying with a recommended insecticide will control these insects. Repeated spraying may be necessary, and this adds to the cost of production. If you feed kale to dairy cattle, be careful to handle the spray compound according to the manufacturer's directions on the label. Do not grow this crop on weedy land as weed control with herbicides is not practical.

Marrow Stem is the most readily available variety of kale. Seeding rate is the same as for rape but the seed is more costly.

### Sunflowers

This crop is very productive. Yields of more than 2 tons of dry matter per acre are common. However, sunflowers are undesirable for supplementary feed because their palatability is poor; lodging, rust and bird damage

are problems; they need cultivation; weeds must be controlled; and they are difficult to handle. Also, cultivation and seed costs make sunflowers one of the more expensive annual crops.

Seed, besides being expensive, is often difficult to obtain. It can be seeded with a grain drill. Giant Russian or Donski varieties seeded at 35 to 50 pounds per acre in rows 24 to 36 inches apart produce excellent stands and heavy yields.

### **Annual Ryegrass**

Ryegrass may be used for pasture and hay. It also can be used as a companion crop in a perennial forage mixture to be grazed the year of seeding. In the past, the only available varieties have not been very productive. Westerwold's, a new tetraploid variety from Holland, tested recently, appears to be more widely adapted. This variety gives good yields and continues to grow late in the fall. In some areas it has produced a very good annual hay crop. It recovers well after clipping or grazing.

Sown alone with a grain drill at 20 pounds per acre, annual ryegrass is usually ready to graze in 8 to 10 weeks. Yields of more than 1 ton of dry matter per acre are common. If the crop is seeded with a perennial forage mixture, you must be careful to control grazing. Ryegrass is highly palatable but excessive grazing may damage the perennial crop. Seed costs are high by comparison with some other annual forages.

### **Winter Rye**

Winter rye is more valuable for pasture than for hay or silage. It is leafy and palatable in the early stages of growth, but it becomes less palatable as it matures. You should seed winter rye from mid-August to early September for late fall or early spring grazing. Seeding in the spring provides summer grazing until September. Grazing can begin 4 to 6 weeks earlier than on other spring-sown annual crops and 2 to 4 weeks earlier than on regular pasture. The crop must be seeded on well-drained soil for early grazing. Rye may be grazed again following a 2-week rest period but it is better to wait 4 weeks before regrazing. After a 4- to 6-week regrowth period in the fall, grain can be harvested the following year. Well-managed grazing in the fall helps winter survival but causes a slight reduction in grain yield. Grazing later than May 24 also reduces grain yield.

Varieties recommended for grain production also give the highest forage yields. Winter-hardy varieties such as Dominant, Sangaste and Tetra Petkus are best for forage. Sangaste gives the earliest spring growth. Seeding rate is 2 to 3 bushels per acre. Seed costs are somewhat higher than for oats, and in some areas seed is not always readily available.

Additional information on rye growing is given in Publication 1185, *Rye for Forage and Grain in the Atlantic Provinces*, available from the Information Division, Canada Department of Agriculture, Ottawa.



## MIXTURES OF CROPS

Many mixtures of annual crops have been tested at Nappan for forage production. In general, mixtures do not appear to be so productive as crops grown alone. However, a mixture may serve some particular purpose better than a single crop.

The main advantage of mixtures is better seasonal distribution of growth. A rapid-growing crop combined with a slower-growing crop (e.g., oats with rye) produces young leafy growth throughout the season. The inclusion of a legume, as in a combination of oats, peas and vetch, may improve feed value.

There are also several disadvantages to mixing crops. Seeding a mixture of crops is usually more difficult than seeding only one kind of seed. Variation in seed size and seeding rate makes sowing with common farm machinery difficult. Mixtures of seed often cost considerably more without increasing yield. Weed control with herbicides may not be possible because of the presence of susceptible crops in the mixture. When crops differing in palatability are combined, one kind may be overgrazed while another is wasted. Finally, differences in rate of maturity may make it impossible to harvest the crop at the best time for any one species in the mixture.

In general, mixtures should be avoided unless required for a special purpose.

### **Corn, Oats, Peas, Vetch and Kale**

This was the most productive mixture tested at Nappan. It has been used with some success for silage. It may also be used for green chop and, possibly, for grazing. Mixing and seeding is a problem; seed cost is high; and the different kinds of seed may not all be available from one dealer. Seed should be sown in June at the rate of 28 pounds of corn, 50 pounds of oats, 45 pounds of peas, 15 pounds of vetch and 1 pound of kale per acre. Use a grain drill to seed the mixture. There is little regrowth after harvesting.

### **Corn and Oats**

These crops give good yields in combination. Seed as early as possible because delayed seeding reduces yield and increases the problem of birds destroying the seed. The mixture can be fed as green chop. Seed is expensive and cultivation is required for weed control. A good seeding rate is 56 pounds of corn and 34 pounds of oats per acre. Seed is usually sown in rows spaced 24 to 36 inches apart. This mixture can be seeded with a grain drill.

### **Corn and Kale**

This crop should be seeded and handled in the same way as a mixture of corn and oats, and it may be used for the same purposes. Seeding rate is 28 pounds of corn and 1 pound of kale per acre. Yields are generally not very satisfactory.



## **Corn and Sunflowers**

This is a very productive mixture when seeded at the rate of 28 pounds of corn and 20 pounds of sunflowers per acre. As sunflowers are not palatable, this is not so useful for forage as some other mixtures of annuals. Sow the crop in the same way as other corn mixtures.

## **Oats, Peas and Vetch**

This combination of crops has long been used for supplementary feed and is commonly referred to as OPV. It is one of the better mixtures and gives dry-matter yields of up to 2 tons per acre. It is used mostly for green chop or silage. To obtain maximum yields of forage, harvest this mixture when the oats are in the milk stage. The amount of aftermath is small. Peas and vetch improve the soil by adding nitrogen to it. Seed is relatively expensive; it is not always readily available; and it has to be mixed before sowing. Spring seeding is recommended. A good seeding rate is 50 pounds of oats, 45 pounds of peas and 15 pounds of vetch per acre.

## **Oats and Vetch**

You can grow a mixture of oats and vetch in the same way as oats, peas and vetch, and seed costs are about equal. Seed the oats and vetch mixture at the rate of 50 pounds of oats and 30 pounds of vetch per acre. These mixtures seldom yield more than oats alone so that the extra seed cost is not warranted unless the quantities of peas or vetch in the forage raise the feed value substantially.

## **Oats and Annual Ryegrass**

Westerwold's annual ryegrass and oats give good yields for grazing and can be used for hay. Seed is relatively expensive. Spring is the time to seed with 15 pounds of ryegrass and 25 pounds of oats per acre. You should seed the crop with a grain drill. The ryegrass recovers well after harvesting or grazing and the oats grows rapidly early in the season. Weeds are not a serious problem and may be controlled with the same common herbicide sprays used for oats.

## **Oats and Winter Rye**

Mixed oats and winter rye are usually seeded in the spring for summer grazing. They can also be seeded in August for fall grazing. The oats grows rapidly and provides early grazing; the rye grows more slowly producing a leafy bottom growth. The oats provides summer and fall grazing but dies in the winter; the rye persists through the winter and is available for pasture about a month before permanent pasture. Rye recovers well after grazing so that a recovery period of 2 to 4 weeks is required for rotational grazing.



Figure 4. A mixture of rye and oats, with oats growing alone on either side. Crops were seeded in rows 7 inches apart.

Seeding rate for this mixture is 34 pounds of oats and 56 pounds of winter rye per acre. All varieties recommended for grain production can be used for forage. The mixture can be seeded with a grain drill. At Nappan, seed and seeding costs were the lowest for the mixtures tested. An application of nitrogen on the rye in the spring increases production considerably.

### **Hungarian Millet and Vetch**

A mixture of 20 pounds of millet and 30 pounds of vetch per acre is not so productive as millet sown alone. Vetch adds nothing to the mixture. Millet production varies considerably from season to season. This was the poorest yielding mixture tested at Nappan.



Table 1.--Seeding rate, cost and use of annual crops for supplementary forage

| Crop or mixture                  | Seeding rate,<br>lb/acre | Approximate seed<br>cost per acre,<br>dollars | Use  |
|----------------------------------|--------------------------|---|--|
| Corn                             | 15 - 60                  | 3 - 9   | Green chop, silage, grain                  |
| Kale                             | 2 - 5                    | 3 - 7   | Green chop, grazing                        |
| Millet                           | 25 - 30                  | 5 - 6   | Hay, green chop, limited<br>grazing        |
| Oats                             | 68 - 102                 | 2 - 3   | Hay, green chop, spring<br>to fall grazing |
| Peas                             | 60 - 90                  | 4 - 7   | Silage, green chop                         |
| Rape                             | 2 - 5                    | 1 - 3   | Green chop, grazing                        |
| Sunflowers                       | 35 - 40                  | 7 - 8   | Silage, green chop                         |
| Vetch                            | 45 - 50                  | 9 - 10  | Hay, green chop                            |
| Ryegrass                         | 20 - 25                  | 12 - 15                                       | Hay, silage, grazing                       |
| Winter rye                       | 112 - 168                | 4 - 6   | Early spring to late fall<br>grazing       |
| Corn, kale                       | 28 + 1                   | 6 - 7   | Green chop                                 |
| Corn, oats, peas,<br>vetch, kale | 28 + 50 + 45<br>+ 15 + 1 | 14 - 15                                       | Silage, green chop                         |
| Corn, oats                       | 56 + 34                  | 10 - 11                                       | Green chop                                 |
| Corn, sunflowers                 | 18 + 20                  | 8 - 9   | Green chop, silage                         |
| Millet, vetch                    | 20 + 30                  | 9 - 10  | Green chop, hay                            |
| Oats, peas, vetch                | 50 + 45 + 15             | 7 - 8   | Silage, green chop                         |
| Oats, vetch                      | 50 + 30                  | 7 - 8   | Silage, green chop                         |
| Oats, ryegrass                   | 25 + 15                  | 10 - 11                                       | Grazing, green chop, hay                   |
| Oats, winter rye                 | 34 + 56                  | 3 - 4   | Grazing                                    |

Table 2.--Yield of annual forage crops seeded in rows seven inches apart with a grain drill

| Crop             | Seeding rate,<br>lb/acre | Yield,<br>tons of dry matter per acre |      |      |         |
|------------------|--------------------------|---------------------------------------|------|------|---------|
|                  |                          | 1960                                  | 1961 | 1963 | Average |
| Japanese millet  | 30                       | 1.55                                  | 1.89 | 3.02 | 2.15    |
| Oats             | 68                       | 2.06                                  | 2.09 | 2.24 | 2.13    |
| Hungarian millet | 30                       | 1.60                                  | 1.08 | 2.12 | 1.60    |
| Rye              | 112                      | -                                     | 1.63 | 1.30 | 1.46    |
| Ryegrass         | 20                       | -                                     | -    | 1.30 | 1.02    |
| Peas             | 60                       | 1.49                                  | 0.43 | 1.13 | 1.02    |
| Vetch            | 50                       | 0.90                                  | 0.72 | 0.67 | 0.76    |



Table 3.--Yield of annual forage crops seeded in rows thirty-six inches apart

| Crop                      | Seeding rate,<br>lb/acre | Yields,<br>tons of dry matter per acre |      |      |         |
|---------------------------|--------------------------|--|------|------|---------|
|                           |                          | 1960                                   | 1961 | 1963 | Average |
| Sunflowers                | 40                       | 2.26                                   | 1.36 | 3.28 | 2.30    |
| Corn and sunflowers       | 28 + 20                  | 1.97                                   | 1.16 | 3.15 | 2.09    |
| Garton's Early Giant rape | 2                        | 2.06                                   | 1.22 | 2.83 | 2.04    |
| English Broadleaf rape    | 2                        | -                                      | 1.48 | 2.06 | 1.77    |
| Dwarf Essex rape          | 2                        | 1.95                                   | 1.27 | -    | 1.61    |
| Marrow Stem kale          | 2                        | 1.45                                   | 0.87 | 2.06 | 1.46    |
| Corn and oats             | 56 + 34                  | 1.67                                   | 0.87 | 1.90 | 1.47    |
| Corn and kale             | 28 + 1                   |  | 0.80 | 1.98 | 1.39    |

Table 4.--Yield of annual forage mixtures seeded in rows seven inches apart

| Mixture of crops                    | Seeding rate,<br>lb/acre | Yield,<br>tons of dry matter per acre |      |      |         |
|-------------------------------------|--------------------------|---------------------------------------|------|------|---------|
|                                     |                          | 1960                                  | 1961 | 1963 | Average |
| Corn, oats, peas, vetch<br>and kale | 28 + 50 + 45<br>+ 15 + 1 | 2.25                                  | 1.72 | 2.51 | 2.16    |
| Ryegrass and oats                   | 15 + 25                  | -                                     | -    | 1.96 | 1.96    |
| Oats, peas and vetch                | 50 + 45 + 15             | 2.08                                  | 1.67 | 1.90 | 1.88    |
| Rye and oats                        | 56 + 34                  | -                                     | 1.99 | 1.58 | 1.78    |
| Oats and vetch                      | 50 + 30                  | -                                     | 1.83 | 1.72 | 1.78    |
| Hungarian millet and vetch          | 20 + 30                  | -                                     | 1.07 | 2.07 | 1.57    |

Table 5.--Yield of kale and rape grown from seed broadcast at various rates

| Crop              | Seeding rate,<br>lb/acre | Yield,<br>tons of dry matter per acre |      |      |         |
|-------------------|--------------------------|---------------------------------------|------|------|---------|
|                   |                          | 1960                                  | 1961 | 1963 | Average |
| Kale <sup>1</sup> | 5                        | -                                     | 1.13 | 1.59 | 1.36    |
|                   | 4                        | -                                     | 0.74 | 1.52 | 1.13    |
|                   | 3                        | 1.64                                  | 0.77 | 1.38 | 1.26    |
|                   | 2                        | 1.32                                  | 0.86 | 1.35 | 1.18    |
| Rape <sup>2</sup> | 5                        | -                                     | 1.52 | 1.28 | 1.40    |
|                   | 4                        | -                                     | 1.36 | 1.27 | 1.32    |
|                   | 3                        | 1.85                                  | 1.26 | 1.17 | 1.43    |
|                   | 2                        | 1.76                                  | 1.15 | 1.12 | 1.34    |

<sup>1</sup>Marrow Stem.<sup>2</sup>Average yield of English Broadleaf, Garton's Early Giant and Dwarf Essex varieties grown separately.

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