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SORREL

PRODUCTION & MARKETING

in the U.S. VIRGIN ISLANDS



COLLEGE OF THE VIRGIN ISLANDS

Cooperative Extension Service • D.S. Padda, Director • St. Croix, U.S. Virgin Islands



SORREL PRODUCTION & MARKETING

in the U.S. VIRGIN ISLANDS

by

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Sorrel, grown mainly for its calyces ("fruit"), is a tropical plant that is cherished by Virgin Islanders and other West Indians, particularly during the Christmas season. Drinks and beverages made from the fruit of the sorrel plant, in some respect, are part of the vast array of cultural foods in West Indian society. It is commonly used in the Virgin Islands as a liqueur when served with rums. The sorrel fruit is also used to make jam, jelly, and marmalade. The extract from bright red fruits is sometimes used as a natural food coloring.

As you read this bulletin, *The Production and Marketing of Sorrel in the Virgin Islands*, you will probably be amazed to discover the sorrel plant's numerous biological features which local farmers attribute to its high rate of successful cultivation in the Virgin Islands. It is practically free from insect infestation; it is resistant to drought; and it has a short maturity period (sow to reap cycle.)

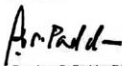
These features make the cultivation of sorrel a worthwhile undertaking for both ardent farmers and family gardeners.

Cultivation of sorrel has been scientifically proven to be an economically profitable enterprise in the Virgin Islands. With the availability of appropriate processing facilities, it could become an economically profitable, processed beverage and food commodity in both U.S. and international markets.

This bulletin should be interesting reading to farmers and fanciers of exotic cuisine. All readers are encouraged to try the sorrel recipes listed.

The Cooperative Extension Service is indeed, happy to have researched this tropical beverage and food crop of economic and intrinsic local value. Plant the sorrel, try using it, and let us know the results!

Sincerely,



Darshan S. Padda, Director



Fig. 1 Sorrel (*Hibiscus subdariffa*). a) fruiting shoot; b) leaf; c) flower; d) longitudinal section of flower; e) fruit; f) cutaway of fruit showing seed pod.

THE PRODUCTION AND MARKETING OF SORREL IN THE VIRGIN ISLANDS

INTRODUCTION

Sorrel (*Hibiscus sabdariffa* L. var. *Sabdariffa* race *Ruber*), also known as roselle or Florida cranberry, is an annual crop grown for the large, thick, acid calyx and bracts that are prized in the making of drinks, jams, jellies, sauces, and liqueurs. Sorrel is believed to have originated in Africa and has been widely distributed throughout the sub-tropical and tropical world. It is a crop suited to the Caribbean conditions. Seeds are reported to have been brought to the New World by African slaves during the slave trade, reaching Brazil around the 17th Century. Since its introduction it has

become naturalized in many areas of the West Indies and Central America. Records available indicate that the plant was cultivated in Jamaica as early as 1707 and in Guatemala before 1840.

The genus *Hibiscus*, of the family Malvaceae, embraces over 200 species, ranging in form from herbs and subshrubs to a large timber tree, such as the Blue Mahoe, indigenous to Cuba and Jamaica. Sorrel is closely related to okra, ornamental species of *Hibiscus*, and to several fiber-producing plants, notably cotton.

DESCRIPTION

Sorrel is an annual, erect, bushy subshrub growing to about 2 meters (7 feet) tall typically with red stems that branch profusely (if properly spaced) before flowering. The leaves are green with reddish veins and long or short petioles. Leaves of young seedlings and upper leaves of older plants are simple; lower leaves are deeply 3 to 5 lobed with jagged margins. Flowers, born singly in the leaf axil are pale yellow with a rose or maroon eye and turn pink as they wither at the end of the day. As in most

species of *Hibiscus*, the individual flowers last for only one day. Flowers are self-pollinated. At the base of the flowers is a typically red calyx consisting of 5 large fleshy sepals with a collar (epicalyx) of 8 to 12 slim, pointed bracts. This fleshy acid calyx (red sepals) is the portion of the plant used as the "fruit". The seed pod (surrounded by calyx) is green when immature and has 5 valves, with each valve containing 3 to 4 light brown seeds. The seed pod turns brown and splits open when mature and dry.

CULTIVARS

Three cultivars of sorrel are recognized in the Virgin Islands:

'Local Tall' - Plant tall [to about 2 meters (7 ft.)], erect and robust. Calyces deep red, fleshy and pointed at apex. Bracts long slender and curved upward.

'Dwarf Early Red' - Plant relatively low-growing [9-1.2 m (3-4 ft.)] and spreading. This cultivar, recommended in some areas of the West Indies, is early-bearing and high-yielding.

'Archer' (sometimes called "white sorrel") - Plant is as tall and robust as the 'Local Tall' but has green stems. Flower is yellow with deeper yellow eye. Calyx is greenish-white and smaller than the 'Local Tall', but the yield per plant is greater. Juice and other products are nearly colorless.

Fig. 2 Right - A dwarf sorrel plant at CVI Experiment Station.



SOILS AND CLIMATE

Sorrel grows and fruits best on a deep, well-drained, fairly fertile sandy loam soil but is adapted to a wide variety of soil types. A good structure is particularly important as sorrel is a very slow grower during the first three to five weeks after germination and is very sensitive to unfavorable influences during this period. Most of the soils in the Virgin Islands will produce a satisfactory crop if other conditions are favorable. However, on high calcium soils such as those found in certain areas on St. Croix, deficiency symptoms of minor elements may occur (see section on fertilizing). Hillside areas,

not suited for vegetables, can be put into sorrel production which could also provide adequate control against soil erosion.

The plant thrives best under tropical and subtropical regions from sea level up to 915 meters (3000 ft.) with about 100-127 cm (40-50 in.) of rainfall well distributed throughout its growing season. Although the sorrel plant is known to be quite drought-tolerant once established, supplemental irrigation during periods of inadequate rainfall could significantly increase yields.

LAND PREPARATION AND PLANTING

The soil should have a good physical structure and tilth. Therefore, it may be necessary to plough and harrow before planting. In low areas where soils may be subjected to water logging, raised beds separated by drainage furrows should be used. If available, well-rotted manure incorporated into the soil would be beneficial in producing a good crop.

Sorrel seeds are usually set directly in the field around late May or June to allow for a sufficiently long period of growth and development. Three to four seeds are usually sown 4 to 5 cm (1½" to 2") deep per planting hole and, when a few inches high, thinned to 1 or 2 plants per hole. It takes approximately 1.12 kg of seed to plant a hectare (1 lb./acre) depending on plant spacing. The recommended spacing between plants is 1.2-1.5 meters (4 to 5 feet) for tall cultivars and about 0.6 meters (2 feet) for

the dwarf type. Spacing between rows is usually 1.2-3.0 meters (4 to 10 feet) depending on the type of cultural operation to be performed. Germination occurs within 7 to 10 days, at which time ungerminated plants should be replaced.

Seedlings may also be raised in nursery beds and transplanted when about 15 cm (6 in.) high. This is especially beneficial where the dry season may sometimes extend into May or June.

Sorrel may be planted at a later date (August or September) but closer spacing between plants [0.6-0.9 m (2 to 3 ft.)] is necessary because plants will not grow as large as those sown in May or June. It should be noted that sorrel planted after September will not be ready for reaping until early January. Plants should be irrigated from planting to maturity if rainfall is not adequate.

FERTILIZING

Newly germinated plants should not be fertilized until they show visible signs of growth, usually 3 to 4 weeks after sowing. The proper amount and type of fertilizer to be applied varies with the specific location on the islands and also the soil type. Soil test results will help in determining the fertility of your soil (refer to Gardeners Factsheets #25 & 26). However, average soils will need a well-balanced fertilizer such as 10-10-10 (N-P-K) at monthly intervals to greatly increase production (refer to Table I).

On high pH soils, sorrel plants exhibit iron deficiency which can be detected by interveinal chlorosis (yellowing) of the leaves. In some cases, terminal leaves become almost white in appearance. One or two applications of chelated iron applied as a soil drench will usually clear up this deficiency. Other minor element deficiencies may be overcome with treatment of the appropriate trace elements (refer to Gardeners Factsheet #16).

TABLE I
Frequency and Amount of Fertilizer (10-10-10) Application

Month	Amount/Plant/Application	
	Grams	(Ounces)
1st (about 3 wks. after sowing) ¹	14.1	½
2nd	28.3	1
3rd	28.3	1
4th	28.3	1
5th (right after 1st harvest)	28.3	1
6th (after 2nd harvest)	14.1	½

¹ Seeds sown in mid-June

PEST AND DISEASES

Weeds can be controlled within and between rows either by frequent hand cutlassing or mowing until the plants are large enough to shade the ground. Weeds are reduced considerably at this time and very little mowing may be necessary. Early pruning will increase branching and development of more flowering shoots.

In the Virgin Islands, sorrel plants are relatively free from insect pests. Occasionally there may be some infestation with scales, aphids and mites. Root-knot and other nematodes are the major pests of sorrel plants. They can seriously reduce root growth, resulting in stunted, weak plants. Methods of preventing nematode damage include crop rotation, additions of organic matter, and use of liquid or granular nematocides (refer to Factsheet #11). Also,

planting in rows or beds where marigolds were growing previously (in dense stands) has been shown to deter root-knot nematode.

Root rot, powdery mildew, and leaf-spot are diseases which may attack sorrel plants during the rainy season. The root rot disease, which causes wilting, can completely destroy an entire crop. The powdery mildew fungus, producing white powdery mold on the leaves and stems, causes the leaves to die prematurely. The plants are sometimes affected by a leaf-spot fungus, but it is rarely severe enough to necessitate treatment. For additional information and assistance on pest and disease prevention and control, contact C.V.I. Extension Service, Pest Management Program.

HARVESTING

The sorrel is a short-day plant with a seasonal production. In the Virgin Islands, flowering usually begins around October (with June planting) and calyces (fruits) will be ready to harvest from late November. Harvesting causes latent buds to develop and extends the flowering life of the plant. Three main harvests can be obtained from late November to mid-February. However, if adequate water is available, extended dry season harvests could be made. Calyces are harvested when full-grown

but still tender (about 3 weeks after flowering), and at this stage, are easily snapped off by hand. They are easier to break off in the morning than at the end of the day. The fruits ripen progressively from the lowest to the highest. If the fruits are left too long on the plant and the stems have toughened, clippers must be used. Harvesting of seeds takes place when the last of the fruits are allowed to mature, at which time the plants are cut down, stacked for a few days, then threshed out.

YIELD

Preliminary results from the C.V.I. Experiment Station indicated that under normal rainfall with a spacing of 1.5 by 1.5 meters (5' x 5'), yield was approximately 8,960 kg/ha (8,000 lbs./acre) or 4.5 lbs./plant. During the following year (a dry year), yield of about 5,824 kg/ha (5,200 lbs./acre) or 1.3 kg/plant (3

lbs./plant) was attained. An estimated 7,282 kg/ha (6,500 lbs./acre) was obtained when both yields were averaged. However, if the above procedures are followed properly and supplemental irrigation is used, average yields of 11,200 kg/ha (10,000 lbs./acre) are possible.



Fig. 3 Sun-drying as a method of dehydration of sorrel calyces.

THE ECONOMICS OF SORREL PRODUCTION

Sorrel production, like all farm enterprise, requires clear economic understanding of cost outlay and potential returns prior to production. Table II of this bulletin illustrates an enterprise budget for sorrel production in the U.S. Virgin Islands. Actual cost figures were utilized together with recommended input requirements for local sorrel production. A

unit of one acre or one hectare was established as the economic basis by which cost and returns were measured. The enterprise budgets are broken down into three major categories: 1) gross receipt from sales, 2) variable cost, and 3) fixed cost. Profitable returns from sorrel production is realized when revenue from sales exceed that of cost.

GROSS RECEIPTS

A gross receipt of \$16,167.24/ha (\$6,500/acre) was obtained by using average yields of 7,282.54 kg/ha (6,500 lbs./acre) derived from

the V.I. Experiment Station estimated yield, coupled with an existing market price of \$2.20 per kilogram (\$1 per pound).

VARIABLE COST

Of the ten items listed under variable cost, fertilizer, nematocide and harvest labor comprised the most costly factors in the production of sorrel. These high cost items in the budget occurred as a result of the following situation: (a) high recommended quantities of fertilizer use as listed in Tables II & III at \$268.18 per hectare (\$108.80/acre); (b) the heavy use of nematocide as listed in Tables II &

III at \$366.49 per hectare (\$148.32/acre) is necessary for the control of nematodes which severely affects the roots of the plant, hence the profitability of the crop; (c) the high cost of harvesting is due in part to the absence of a mechanized system for harvesting the sorrel crop. As a result, local farm producers have avoided planting large acreage in sorrel.

RETURNS FROM SORREL PRODUCTION

One of the persuading factors that tends to make sorrel production economically attractive is the short duration in which investment is tied up in the production process. The investment time in sorrel production covers a period of approximately four months. Thus, the realization of profit from the sorrel crop occurs in a

relatively short period. As illustrated in Table II, returns from sorrel production were obtained by subtracting both variable and fixed cost (total cost) from gross receipts, thereby arriving at a net return of \$11,544.89 per hectare (\$4,632.64/acre).

OTHER FACTORS AFFECTING COST AND RETURNS

It should be noted that due to the topography of the islands, some areas tend to be sloping, making it rather difficult to operate farm machinery during the land preparation process. Therefore, land areas with high de-

grees of slope will require much higher labor cost resulting in marked increases in total production cost. Any increases in production cost will cause a corresponding decline in net returns per acre.

MARKETING OF SORREL

Fresh sorrel is normally sold to vendors in the public markets roadside stands and a few small grocery stores. Apparently, due to low levels of production, sales of large volume have not entered the major supermarkets or other

large marketing outlets. It is also interesting to note that current import data shows no trace of sorrel from abroad, hence no external competition exists.

Sorrel is generally sold in the fresh market

TABLE II
Estimated Cost and Returns Per Acre
For Sorrel Production

<u>Items</u>	<u>Yield</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Value</u>
Sorrel (w/seed fresh)	6,500	lb	1.00	<u>\$6,500.00</u>
Gross Receipts				<u>\$6,500.00</u>
<u>Variable Cost</u>	<u>Input Used</u>			
Seeds	3.00	lb	2.00	2.00
Manure	4,000.00	lb	--	--
Fertilizer	544.00	lb	0.20	108.80
Fungicide	2.00	lb	2.70	5.40
Nematocida	36.00	lb	4.12	148.32
Tractor (rental) ¹	1.00	acre	45.00	45.00
Tiller (rental) ¹	2.00	day	5.00	10.00
Labor ²	40.00	hrs	3.17	126.80
Int. on Op. Cap. ³	4.00	dol	4.46	<u>17.84</u>
Subtotal				<u>464.16</u>
<u>Harvest Cost</u>				
Picking and Packing	436.00	hrs	3.17	<u>\$1,382.12</u>
Subtotal				<u>\$1,382.12</u>
Total Variable Cost				<u>\$1,846.28</u>
<u>Income Above Variable Cost</u>				<u>\$4,653.72</u>
<u>Fixed Cost</u>				
Equipment	1.00	acre	15.00	15.00
Other	1.00	acre	6.08	<u>6.08</u>
Total Fixed Cost				<u>21.08</u>
Total Cost				<u>\$1,867.36</u>
Net Returns				<u>\$4,632.64</u>

¹ Based on Dept. of Agriculture estimated rental fee per acre

² Dept. of Labor minimum farm labor wages

³ Interest on Operating Capital

TABLE III
Estimated Cost and Return
Per Hectare For Sorrel Production

<u>Items</u>	<u>Yield</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Value</u>
Sorrel (w/seed fresh)	7,282.54	kg	2.22	<u>\$16,167.24</u>
Gross Receipts				<u>\$16,167.24</u>
<u>Variable Cost</u>	<u>Input Used</u>			
Seeds	1.11	kg	4.44	4.93
Manure	4,481.57	kg
Fertilizer	609.50	kg	0.44	268.18
Fungicide	2.22	kg	6.00	13.32
Nematocide	40.01	kg	9.18	366.49
Tractor (rental)	1.00	ha	111.15	111.15
Tiller (rental)	4.94	day	5.00	24.70
Labor	98.80	hrs	3.17	313.20
Int. on Op. Cap.	4.00	mth	11.02	<u>44.08</u>
Subtotal				<u>\$1,146.05</u>
<u>Harvest Cost</u>				
Picking and Packing	1,076.92	hrs	3.17	<u>\$3,413.84</u>
Subtotal				<u>\$3,413.84</u>
Total Variable Cost				<u>\$4,559.89</u>
 <u>Income Above Variable Cost</u>				<u>\$11,607.35</u>
<u>Fixed Cost</u>				
Equipment	1.00	ha	37.05	37.05
Other	1.00	ha	15.02	<u>15.02</u>
Total Fixed Cost				<u>52.07</u>
Total Cost				<u>\$4,611.96</u>
Net Returns				<u>\$11,555.28</u>

during the Christmas seasons, and no additional preparation is needed for sale on the local market. Existing market price seems to fluctuate around \$2.22 per kilogram (\$1.00-\$1.25/lb.) during the crop season. Another marketing advantage of this crop is its storing and drying potential, thus reducing spoilage. Value is added to the commodity (sorrel) when the crop is desecded and sundried for future sales. When dried, a pound of fresh sorrel is reduced to approximately 40.8 grams (1.44 ounces). Even though the market for dry

packaged sorrel does not command much attention at this time, farmers speculate that a price of \$2.00 per 56.7 grams (2 oz.) package can be obtained. The drying (Figure 3) and storing of sorrel will allow producers to sell their crop throughout the year, hence allowing time to take advantage of higher prices during the off season periods. In short, sorrel sales (of both fresh and dry) can be most profitable, but clear understanding of market sources should precede all production.

TABLE IV
Labor Estimation for Sorrel
Production

<u>Operations</u>	<u>Time</u>	<u>(Hours)</u>
a) Applying fertilizer	13.00	hrs.
b) Applying fungicide	5.00	hrs.
c) Planting and applying nematocide	11.00	hrs.
d) Applying manure	4.00	hrs.
e) Tilling	7.00	hrs.
TOTAL	40.00	hrs.

PROCESSING POTENTIAL

The processing of sorrel involves another step in the marketing process. The end result is a more marketable and consumable product. Value is therefore added to the product due to the fact that labor, time and capital would be necessary to transform the sorrel from its raw stage to a consumable one. In general, the final consumption stage of sorrel is in the form of a beverage or drink. In some cases raw sorrel is processed into a concentrate liquid or made into solids.

Processing of sorrel generally requires heavy capital investment. The major function of processing would be to reduce the labor intensive method traditionally practiced by most households and at the same time make it possible for sorrel products to be readily available to consumers at a reasonable price.

A few countries have already taken the lead in sorrel processing for both their domestic and international markets; such countries are Trinidad, Dominica and some countries in Africa.

Local agribusiness firms have expressed an interest in the processing of sorrel. However, unless adequate amounts of sorrel are produced on the islands or obtained from elsewhere, processing would not be possible or worthwhile.

A legal contractual arrangement between farmers and agribusiness firms may serve as a stimulating force to intensify local sorrel production, thereby increasing sorrel supplies. The processing of sorrel may also have a far reaching effect on reducing local consumption levels of imported drinks as well as providing a steady income for farm producers.

In various tropical and subtropical countries all parts of the sorrel plant are utilized for food, feed or beverage. Nutritionists have found sorrel calyces to be high in calcium, niacin, riboflavin and iron. Table V lists the composition of sorrel calyces and leaves.

Sorrel calyces are best prepared for use by washing, then making an incision around the base of the calyx below the bracts to free and remove it with the seed capsule attached. The calyces are then ready for immediate use or may be frozen or dried for out-of-season supply.

Throughout the West Indies and tropical America, sorrel is prized primarily for the cool and refreshing beverage made from the calyces. The drink is attractive in appearance with its wine red clarity. The flavor is tart but pleasantly distinctive.

An excellent reddish sauce, very similar in

appearance and flavor to cranberry sauce, may be prepared from the calyces. Jam, jelly, chutney and marmalade may also be prepared.

Sorrel sauce or syrup may be added to puddings, gelatins and salad dressings, and also poured over ginger bread, pancakes, waffles or ice cream. Fermented, the juice yields an excellent wine; and the dried calyces are utilized to make extracts for flavoring liqueurs.

Today, there is a strong resurgence of interest on the part of food and beverage manufacturers who anticipate further FDA restriction on synthetic red colorants. The trend toward "natural" foods could create a new demand for sorrel as a color agent. In some areas of the tropics the young leaves are cooked as greens alone or in combination with other vegetables. They are also added to curries as seasoning. The seed is high in protein and is considered excellent feed for chickens.

TABLE V

Nutritional Composition of Sorrel, Per 100 GM. Edible Portion

Part of Plant	Moisture %	Cal.	Protein gm	Fat gm	Carbohydrate gm	Calcium gm	Phosphorus mg	Iron mg	VITAMINS				
									Vit. A mcg	Thiamine mg	Riboflavin mg	Niacin mg	Ascorbic Acid mg
Calyces ¹	84.5	55	1.7	1.0	12	110	39	2.2	10	.04	.06	0.2	6
Calyces ²	86.0	44	1.8	0.1	11	160	60	3.8		.04	.06	0.5	14
Leaves ²	85.0	43	3.3	0.3	9	213	93	4.8		.17	.45	1.5	54

¹ Compiled by Woot-Tsuen Wu Leung, Nutrition Officer, National Institute of Health, Interdepartmental Committee on Nutrition for National Defense, Bethesda 14, Maryland.

² FAO, 1968. Food Composition Table for Use in Africa, FAO, Rome

SOME SORREL RECIPES¹

SORREL DRINK - 1

Wash sorrel and take off the red sepals. Make a light syrup with 2 cups sugar and 2 cups water. Pour while boiling hot over the sorrel and leave overnight. In the morning strain and bottle. Serve with ice and soda water.

SORREL DRINK - 2

3 cups sorrel sepals 6 cups boiling water
small piece of ginger 6 cloves
piece of dried orange peel 2 cups sugar

Wash the sorrel and place in a jar with the ginger, orange peel and cloves. Pour on boiling water and allow to stand for 24 hours. Strain and sweeten and pour into bottles. Use as required with ice and soda water.

SORREL JELLY - 1

Wash the sorrel and place the whole fruits in a pan. Add enough water to cover, and boil for an hour or until the fruits are soft. Strain the juice through a jelly bag. To every cup of juice allow 3/4 cup sugar. Bring the juice to the boil and add the sugar. Boil rapidly until it passes the jelly test.² Pour into clean hot jars and seal.

SORREL JELLY - 2

(Makes 3 to 4 quarts)

2 pounds sorrel 1" pc. crystallized ginger
1 tablespoon lemon juice 5 cups (2½ lbs.) sugar

Combine the sorrel, lemon juice, and ginger with water to cover. Simmer for 25 to 30 minutes. Strain, discard the flowers and ginger. Add the sugar to the liquid and boil until the mixture passes the jelly test. Pour into clean hot jars and seal.

¹These recipes have been tested by the CVI Home Economics Department.

²The jelly test for doneness.

The biggest problem in making jelly is to know when it is done. It is particularly important to remove the mixture from the heat before it is overcooked. Although an undercooked jelly can sometimes be recooked to make a satisfactory product, there is little that can be done to improve an overcooked mixture. Signs of overcooking are a change in color of mixture and a taste or odor of caramelized sugar.

Spoon or sheet test. Dip a cool metal spoon in the

boiling jelly mixture. Then raise it at least a foot above the kettle, out of the steam, and turn the spoon so the syrup runs off the side. If the syrup forms two drops that flow together and fall off the spoon as one sheet, the jelly should be done.

Refrigerator test. Pour a small amount of boiling jelly on a cold plate, and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it should be done. During this test, the jelly mixture should be removed from the heat.

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- Seeding Vegetable Crops*—Gardeners Factsheet No. 2
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- Mulch for Your Garden*—Gardeners Factsheet No. 5
- How to Prepare Your Own Compost*—Gardeners Factsheet No. 6
- Staking and Training Tomato Plants*—Gardeners Factsheet No. 7
- Growing Spinach in the Virgin Islands*—Gardeners Factsheet No. 10
- Controlling Nematodes in the Vegetable Garden*—Gardeners Factsheet No. 11
- Propagation of Fruit and Ornamental Plants by Layering*—Gardeners Factsheet No. 12
- Propagation of Fruit and Ornamental Plants by Cutting*—Gardeners Factsheet No. 13
- Propagation of Fruit and Ornamental Plants by Grafting*—Gardeners Factsheet No. 14
- Propagation of Fruit and Ornamental Plants by Budding*—Gardeners Factsheet No. 15
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