

Growing Summer Squash

As urban and suburban areas continue to develop and consumer demand for fresh vegetables remains strong, an opportunity exists for vegetable growers to grow and sell produce through various market outlets. Summer squash may fit into the production systems for many of these growers. Many health-conscious consumers prefer locally grown fresh produce as part of their diets.

Summer squash, as a member of the cucurbit family, are eaten at an immature stage. The fruit of summer squash is low in calories and has a wide range of tastes and uses. Most varieties produce marketable fruit within eight weeks of planting and bear as long as the fruit are continually picked and the plants are not damaged by diseases or insects. Harvested fruits are highly perishable and must be marketed immediately.

Varieties

The many types of summer squash range from straightneck to zucchini to gourmet scallopini. They are usually divided into crookneck, straightneck, scallop, and zucchini types, although some new types do not fit well into these groupings. Test new types on a small scale to determine market acceptance. Some recommended varieties are listed in Table 1.

Preparing the Soil

Summer squash will grow in any well-drained soil with good organic matter content (at least 1.5 percent). Before planting, have the soil tested at the University of

Table 1. Recommended hybrid varieties.

Variety (from earliest to latest within category)

Crookneck Type

Sundance

Straightneck Type

Seneca Prolific

Multipik

Superpik

General Patton

Scallop Type

Peter Pan (green)

Sunburst (golden)

Zucchini Type

Zucchini Elite

Seneca Zucchini

Blondie (pale yellow)

Gold Rush (golden)



Maryland Soil Testing Lab to determine recommended amounts of fertilizer and lime. Soil test information and containers are available from local Maryland Cooperative Extension offices.

Soil pH should range from 6.0 to 6.5. Because squash are sensitive to acid soils, liming is recommended for soil pH below 6.0.

In the absence of a soil test, broadcast and incorporate 500 pounds of 10-10-10 and one pound of boron per acre before planting. Sidedress with 500 pounds of 10-10-10 per acre when the vines start to run.

If it is possible to apply fertilizer through a sprinkler irrigation system, broadcast and incorporate 500 pounds of 5-10-10 and one pound of boron per acre before planting, sidedress 500 pounds of 10-10-10 per acre when the vines start to run, and then apply 25 pounds of nitrogen per acre through the irrigation system as the plants come into full production.

If fertilizer is to be injected into a trickle system under plastic mulch, broadcast and incorporate 1,000 pounds of 5-10-10 and one pound of boron per acre before the plastic is laid. Then apply 25 to 50 pounds per acre total (5 to 7 pounds per application) of nitrogen through the trickle irrigation system.

Keep in mind that boron must be **broad-cast** and incorporated before planting to avoid toxicity problems.

Planting

Squash is a warm weather crop and should be planted when all danger of frost is past and the soil is warm—at least 55°F in the top 3 inches of soil (April 15 through August 15). Plant 4 to 6 pounds of seed per acre in rows 5 to 6 feet apart with plants 2 to 3 feet apart in the row.

Most seed has been treated with a fungicide and an insecticide by the seed producer. If the squash is to be grown organically, be sure to specify untreated seed at the time the order is placed. Untreated seed can be treated at planting time, if desired, using a mixture of thiram and an approved commercially available insecticide following label directions.

Summer squash is usually direct seeded. For planting into plastic or paper mulches, use 2- to 3-week-old transplants grown in peat pellets, containers, or cell-trays. Transplants should have good root systems. Minimize root disturbance as much as possible to reduce transplant shock. Begin planting when the average daytime temperature has reached a minimum of 60°F and night temperatures are no lower than 45°F (usually about April 15 to May 1). Protect

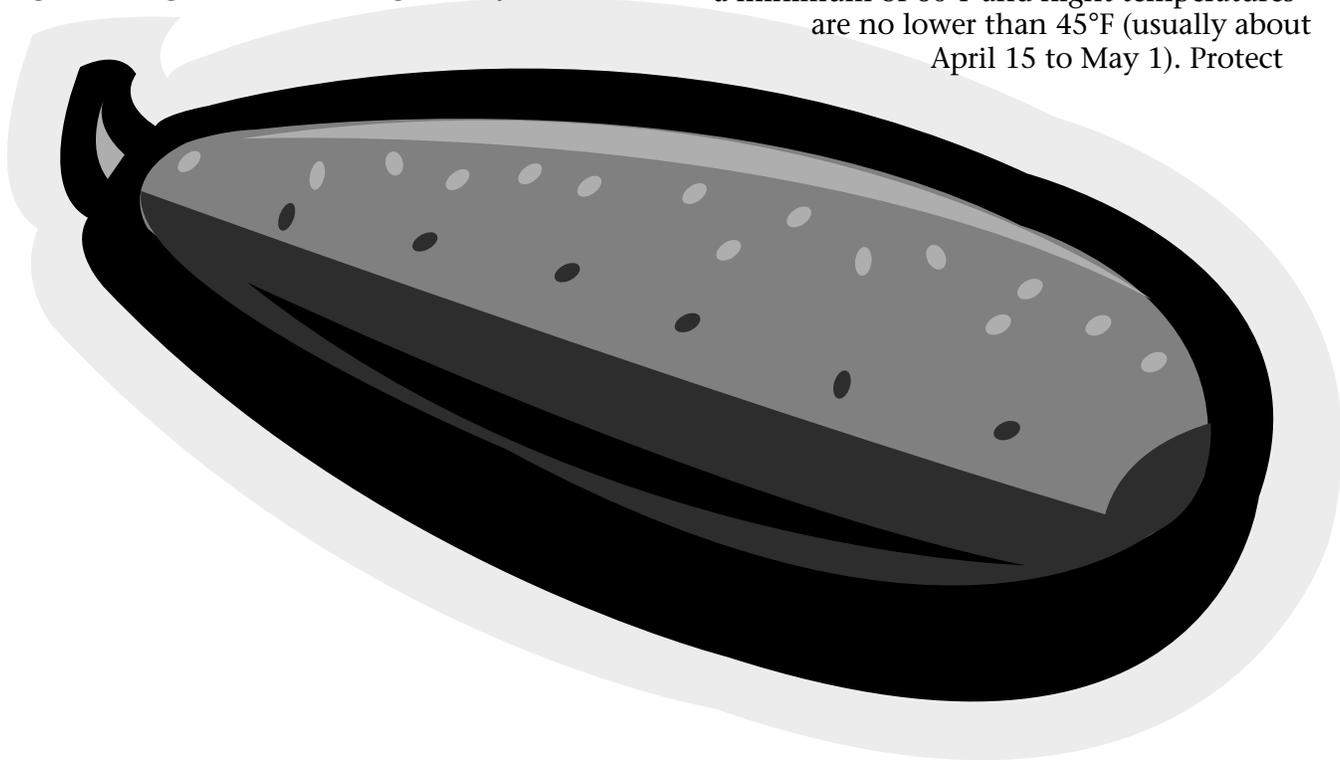


Table 2. Identification and control of insects.*

Pest	Description	Damage	Action Level	Treatment
Aphids	Tiny, soft-bodied; yellow-green to black; on under-sides of leaves.	Leaves curl under and turn brown; aphids may carry virus diseases.	As needed every 5 to 7 days, especially for late season crop.	Reflective mulches. Diazinon 4EC, or Metasystox-R 2SC, or Thiodan 3EC. Lannate LV (melon aphid only).
Cucumber Beetles	Yellow to green; 1/4 inch long; black spots or stripes.	Feed on young leaves and flowers; can carry bacterial wilt disease.	When feeding damage is heavy on young plants or if adult beetles are abundant and disease has occurred.	Adios, or Asana XL, or Lannate LV, or methoxychlor 50WP, or Sevin 80S**, or Thiodan 3EC. Begin when seedlings emerge and repeat every 7 days until flowering if new beetles continue to invade fields. Check current EB 236 for use of Admire.
Spider Mites	Very tiny, spider-like; on under-sides of leaves; favored by hot, dry weather.	Tiny whitish specks on leaves; then browning.	When 10-15% of crown leaves infested early in the season or when 50% of terminal leaves infested.	Agri-Mek 0.15EC, or Kelthane 50WP. Spot treat localized infestations.
Squash Vine Borer	Larvae are thick, white, wrinkled with brown head, one inch long; adults are clear-wing moths.	Sudden wilting of plants; yellow frass at base of stems; rotting of damaged stems.	When vines begin to run, apply to base of plants.	Exclude insects with row covers. Asana XL 0.66EC, or methoxychlor 50WP, or Thiodan 3EC. Apply 4 times at 7-day intervals.
Squash Bug	Adults are flat, brownish, 5/8 inch long; nymphs are smaller, gray/green, no wings.	Leaves brown, wilt.	Every 7 to 10 days as needed after vines begin to run.	Asana XL 0.66EC, or Sevin 80S.**

* Before bloom, consider using floating row covers to exclude insects.

**Continuous use of Sevin or pyrethroids may cause mite outbreaks.

early plantings from wind by using hot caps or row covers.

Plastic Mulches

Plastic mulches of 1 1/4 or 1 1/2 mil thickness are now being used by producers for a number of vegetable crops. They generally offer earlier yield and greater total yield, and black types will control weeds in the row. Highest marketable yields of summer squash

have been obtained from plants growing on blue plastic, but this type is less readily available. If plastic mulches are to be used, some fertilizer must be applied (unless injection through a trickle system is possible) and soil must be moist prior to laying the plastic. Using plastic mulches without any irrigation is not recommended.

Clear plastic gives some advantage over black in soil warming and early yield, but a fumigant

such as Vapam will be needed since weeds grow vigorously under clear plastic. There is no need to fumigate under black plastic.

Plastic mulches that are 48 inches wide are preferred. Lay them in rows on 5- to 6-foot centers. Be sure the edges are completely buried to prevent wind from pulling the mulch loose. Raised beds are more productive than flat beds. Herbicides can be used to control weeds between the plastic strips if applied carefully before planting. Check Extension Bulletin (EB) 236, "Commercial Vegetable Production Recommendations" for more detailed information.

Irrigation

Irrigate shortly after planting if the soil is dry. Squash will require about 1 inch of water per week, either through rainfall or irrigation, especially during bud development and flowering. Trickle irrigation systems should be used under plastic mulches when either fertilizers or pesticides are to be applied in irrigation water.

Pest Management

Good cultural practices and careful use of pesticides can help reduce losses from weeds, insects, and diseases. Be sure to check a current revision of EB 236 for the most recent recommendations. Read and follow directions on all pesticide labels.

Weeds

Weed pressure can be reduced through the use of mulches (organic or plastic), cultivation, and herbicides. If herbicides are used, check the label

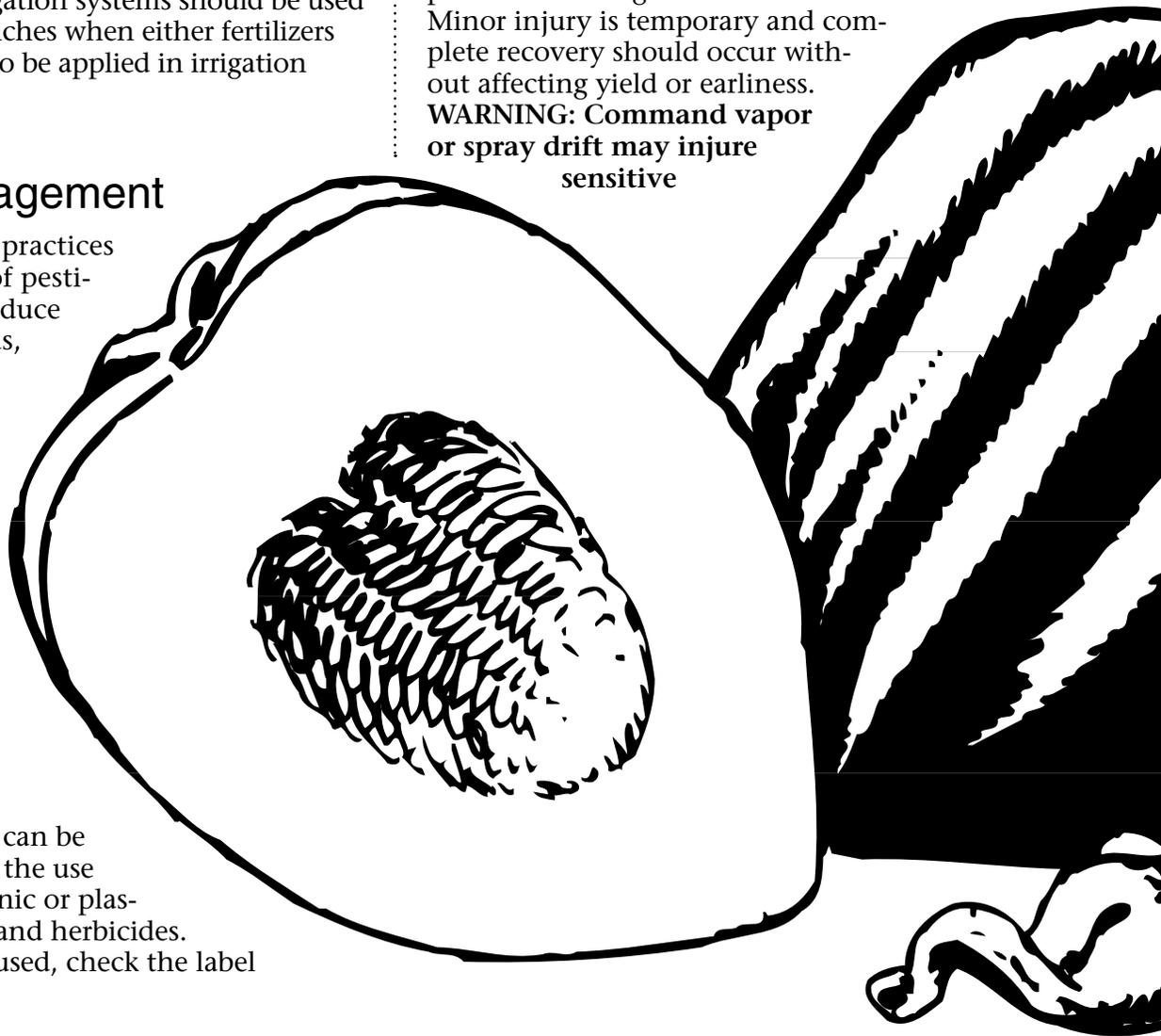
for restrictions on planting a later crop. The following herbicides are currently labeled for summer squash grown without plastic mulch:

Preplant Incorporated or Preemergence

Apply 5 to 6 quarts per acre of Prefar 4EC. Incorporate 2 inches deep or less before seeding or transplanting, or apply preemergence and activate with 1.5 to 1 inch of irrigation immediately after seeding. Prefar is effective on grasses but weak on many broadleaf weeds. Check the label for crops that can be planted after use of Prefar.

Apply 4 to 6 fluid ounces per acre of Command 4EC to control annual grasses and broadleaf weeds. The rate will depend on soil type. Preplant incorporation reduces the chance of vapor drift but increases risk of crop injury. The injury will appear as a partial whitening of leaf or stem tissue. Minor injury is temporary and complete recovery should occur without affecting yield or earliness.

WARNING: Command vapor or spray drift may injure sensitive



plants up to several hundred yards away from application. Do not use Command near sensitive plants or if drift will carry the material onto sensitive plants. See label for complete precautions.

Preemergence

Apply 1.5 to 2 pints per acre of Curbit 3E to control annual grasses and certain broadleaf weeds including carpetweed and some pigweed species. Control of many other broadleaf weeds might not be acceptable. Dry weather following application can reduce effectiveness. Cultivate to control emerged weeds if rainfall or irrigation does not occur before emergence of weeds.

Postemergence

Apply 1.6 pints per acre Gramoxone Extra 2.5SC as a directed spray between the rows after crop establishment to control emerged weeds. Do not allow spray or spray drift to contact the crop. Use low pressure and shields to prevent spray contact with the squash.

Apply 1 to 1.5 pints per acre Poast 1.5EC to control annual grasses and certain perennial grasses. Oil concentrate can be used according to label directions to enhance activity.

Insects

Inspect fields regularly for insects that can reduce squash yields and quality. Always identify the insect before deciding on the proper measure for control. Contact your local Cooperative Extension office for help in identifying and controlling insects.

Reflective (silver or metalized silver) mulches can be used to control weeds and repel aphids that transmit viruses in fall-planted squash; these mulches

are often readily available and relatively easy to apply. Direct-seed through the mulch for maximum virus protection. Rotations with noncucurbit crops are always recommended. Some growers have successfully used floating row covers to keep insects from infesting the squash. At flowering, the covers must be removed for pollination to occur.

Table 2 lists the most common insect problems for squash and cultural and chemical recommendations for control. Also consult EB 236 for further information.

Diseases

A good insect management program is essential for controlling viruses and bacterial wilt, two of the most common diseases of summer squash. Other diseases, such as downy mildew and powdery mildew, usually occur in late season. A fungicide program will help control these diseases.

Use resistant varieties, when available, to reduce disease problems. Good cultural practices will also help. For assistance in identifying and controlling squash disease, contact your local Cooperative Extension office. Also consult EB 236 for current recommendations.

There are a number of **viruses** that can affect summer squash. Infected plants are stunted, and new leaves are often dwarfed, mottled (patterned yellow and green), distorted, and angular. Fruit may also be mottled, distorted, and unmarketable.

Viruses are carried by insects, chiefly aphids, from weeds and from other infected plants. To control viruses:

- Use resistant varieties when possible. The yellow-fruited variety Multipik will not turn green when infected with watermelon or cucumber mosaic virus. However, it will show symptoms of infection from papaya ring spot or zucchini yellow mosaic viruses.
- Practice strict aphid control for early season crops.
- Plant late season crops (after July 1) as far as possible from existing squash and pumpkin plantings.
- Use reflective mulch.

Bacterial wilt overwinters in the gut of cucumber beetles and is transferred to young plants during early season feeding. As the



plants mature, however, they become less susceptible to the disease. Control cucumber beetles (Table 2) before they feed on the young plants. Older plants probably will not need continued treatments.

Check fields for **downy and powdery mildew** beginning in mid-July. Begin fungicide sprays for downy mildew when the canopy closes (plants touch each other) or if the disease is observed. Downy mildew begins as yellow spots on the leaves, which eventually turn brown, with a fine, gray downy growth on the undersurface. The leaf edges brown and turn inward as the leaf dies.

Treat for powdery mildew when one lesion is found on the underside of each of 45 older leaves. The disease begins as pale yellow spots that become covered with powdery, white spores.

Consult EB 236 for effective spray schedules that will also help to delay the development of fungicide resistance.

Pollination

Honeybees are essential for good fruit set. It may be necessary to rent hives (one hive per acre) to ensure adequate pollination of squash. If insecticides must be used during bloom, apply them in the evening when fewer bees are working. Many insecticides are quite toxic to honeybees.

Harvesting

For best quality summer squash, harvest when fruit are young and ten-

Straightneck and zucchini types should be about 6 to 8 inches long. Using a slight twist, gently break the squash from the plants or carefully cut with a sharp knife. Leave stems attached and neatly trim them later for market. Remove over-mature cull fruit from the plants to maintain maximum production. These can be left in the field.

Summer squash are highly perishable since the skin is tender and easily wounded in handling. They can only be stored for a few days without rapid deterioration. It is possible to hold them for up to four days if they are kept at 32 to 40°F and 90 percent relative humidity.

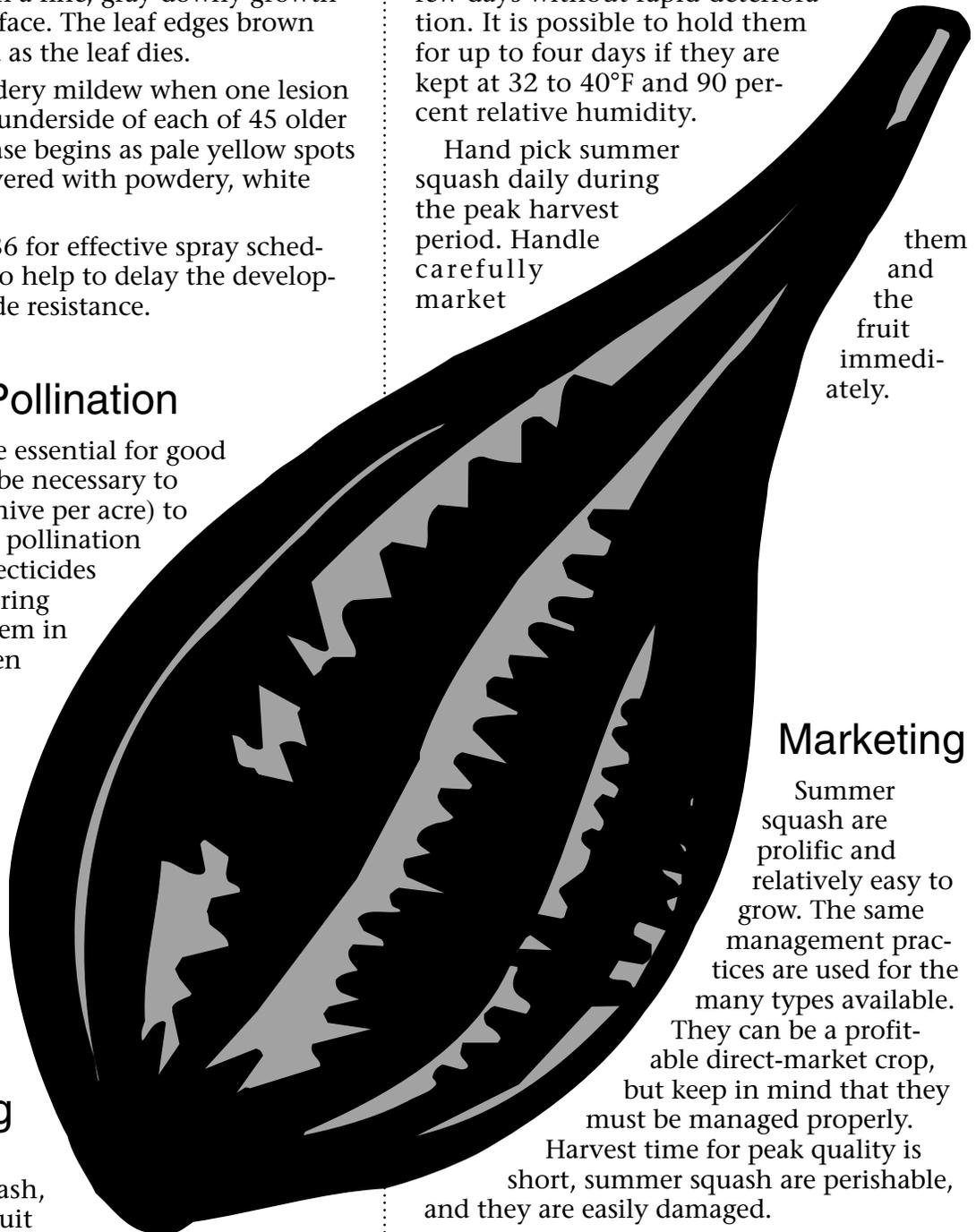
Hand pick summer squash daily during the peak harvest period. Handle carefully market

them and the fruit immediately.

Marketing

Summer squash are prolific and relatively easy to grow. The same management practices are used for the many types available. They can be a profitable direct-market crop, but keep in mind that they must be managed properly.

Harvest time for peak quality is short, summer squash are perishable, and they are easily damaged.



Costs and Returns

A sample budget for growing costs is shown in Table 3, "Costs and Returns." Actual costs vary with each operation. Charges for grading, sorting, and hauling are not included. To determine total costs, remember to add the fixed costs for land and equipment.

The use of plastic mulches and drip irrigation systems will raise initial costs substantially, but increased returns from greater yield and high quality should offset this expense. Income will depend on the quantity of squash produced and the price at which it is sold.

Mention of trade names does not con-

stitute an endorsement by Maryland

Cooperative Extension.

**Table 3. Costs and returns.
Yield and Price Assumptions**

	Yield (1/2 bu)		Price (1/2 bu)	
	\$1.50	\$5.50	\$10.00	
1000	1,500	5,500	10,000	
1200	1,800	6,600	12,000	
1400	2,100	7,700	14,000	

Estimated Costs per Acre

<u>Material</u>	<u>Cost/acre</u>
Cover crop seed (2 bu rye seed)	23.00
Lime (1,000 lb/A limestone-bagged)	119.00
Fertilizer (bagged)	
500 lb 10-10-10	59.50
500 lb 5-10-10	54.50
75 lb ammonium nitrate	16.00
7 lb fertilizer borate	1.80
Seed (4 lb x 67.00)	268.00
Herbicides	96.00
Insecticides	66.00
Harvest labor (200 hours @ 7.50)	1,500.00
Boxes (1200 @ 1.00, waxed)	1,200.00
<u>Total cash costs</u>	<u>3,403.80</u>

Note: Add in labor costs for sorting, marketing, and transportation and fixed costs for land and equipment to get the total costs.

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