

Flowers

1. Anthuriums
2. Ginger Lily
3. Heliconias
4. Orchids

TECHNOLOGY PACKS



ORCHIDS

November 2015

Background

Production decisions concerning how much effort and resources to invest and which farming practices to follow, have consequences and create opportunities for the farm affecting production levels, input costs, time constraints, and the potentially size of the operation. They also may have implications for resource use and environmental quality.

Numerous information exist on the various aspects of production and handling/ marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and climate change that impact on the environment and rural livelihoods. These issues are also closely related to the importance of the role of primary producers in increasing the earnings of all actors along the value chain in supporting the development of a commercially viable and sustainable agricultural industry.

The production of high quality and easily understood information packages is critical as this forms a basis for farmers to obtain financing from lending institutions and to efficiently increase their production through the availability of modern technology. This will also result in a reduction of rural unemployment and will greatly help in alleviating poverty and other associated social ills.

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Introduction

This Technological package (Tech Pack) deals with the production and post harvest aspects of orchids.

Also included in the Tech Pack are appendices:

- Template for cost of production
- List of recommended pesticides and application rates
- Good Agricultural Practices data record sheet.

Notwithstanding the identification of any specific pesticide for the control of pests and diseases, this decision is for the discretion of the Ministry of Agriculture Area Extension Officer and the farmer.

However, the mention of any pesticides and other products used in the Tech Pack should strictly comply with local regulations and all instructions provided by the manufacturer. Also, the use of trade names in the Tech Pack is for the purpose of citing examples and is not meant to either endorse or discredit any particular product.

Botanical Description

Orchids (*Orchis spp.*) belong to the family Orchidaceae. The family contains over 800 genera and over 25,000 known species. Most cultivated orchids are native to the tropics. In their natural habitat, they attach themselves to the bark of trees, or the surface of other plants. Their thick, white roots are specially adapted to absorb moisture and dissolved nutrients. Because these tropical orchids usually grow high in the trees, rather than on the forest floor, they are accustomed to good air circulation and plenty of light. They prefer a 12-hour day, all year-round, and require a high intensity of light. Six elements are essential for successful orchid production, these are: water, temperature, light, air movement, humidity, and fertilizer.

Varieties

The genera comprise of over 100,000 hybrids and cultivars. They possess a magical beauty and allure, with incredible colors, shapes, and scents. The common genera grown as cut flowers are: Cattleya, Cymbidium, Phalaenopsis, Dendrobium, Vanda, Ascocenda, Arachnis and its hybrids, Oncidium (Golden Showers) and Paphiopedilum. The common genus cultivated in St. Lucia is Dendrobium with many species of varying colour and shapes. (Some examples are shown in Plates 1 - 4).



Plate 1



Plate 2



Plate 3



Plate 4

Temperature

Dendrobiums grow best when night temperatures do not drop below 65°F (18°C) and day temperatures are between 75 - 85°F (24°C - 29°C).

Site Selection

When choosing a site for orchid production, the following should be considered:

- Affordable land cost
- Level topography and good drainage
- Presence of good windbreaks
- Bright sunlight
- Low to moderate rainfall
- Good air movement but without regular strong winds
- A reliable source of good quality water
- Proximity to utilities and roads.

Structures

Dendrobiums should be grown in shade cloth-covered structures. In high rainfall areas it is advisable to use structures covered with polyethylene film in addition to shade cloth. The sidewalls of both types of structures should be covered with shade cloth. The basic function of these structures is to provide a protective environment for crop production. They reduce the intensity of bright sunlight and provide some protection from strong winds, heavy rains, and large pests.

Nursery Operations

All cultivated dendrobium orchids, whether seedlings or clones, are started in flasks. The flask environment provides the plantlets with ideal conditions for early growth. Seedlings should be

hardened when received before transplanting. The agar medium must be completely washed from the plantlets. A minimum of two washings is recommended. Plantlets should then be graded by size after washing.

The pot medium must be pathogen free, with good moisture holding capacity for the tender young roots and good drainage. Good air movement is required to prevent anaerobic conditions that will suffocate root tissue and promote the growth of certain bacteria, algae, and other microorganisms. Available materials include perlite, styrofoam, and charcoal. These are often mixed with other materials such as chopped tree-fern fiber, peat, fine bark, coir and sphagnum moss, after pasteurization, which can be accomplished with hot water at 200°F (85°C) for a minimum of 30 minutes.

Transplant seedlings into 2½ inch (6 cm) pots or plug trays containing a growing media. Seedlings transplanted should be 0.5 – 2 inches (1 - 5 cm) tall with one or three roots of 1 inch (2.5 cm) or longer. Separate plantlets of similar size together into the same pot or plug tray. The plantlets should be healthy, with thick green leaves and active roots. A healthy and vigorous plantlet will re-establish quicker in its new environment than a weakened plantlet.

When transplanting in pots or plug tray hold the plantlet upright and gently press the roots to the medium with a planting stick. Pots and plug trays should be placed pot-to-pot on sanitized wire-covered benches 2½ feet (76 cm) or more tall so that splash from the ground cannot reach them. This area of the nursery should have a solid roof to protect the plantlets from rain and shade cloth to provide subdued light. It should have a fog or mist system to create a high relative humidity. Good air movement is essential; if natural air movement is inadequate, fans should be installed.

After 2 - 3 weeks, a dilute (about ¼ strength) solution of liquid fertilizer can be applied. As new root activity increases, shade should be decreased and misting should be discontinued in favour of several hand-waterings per day. As plants adjust favourably to the higher light, the concentration of liquid feeding can be increased. Most cultivars and seedling crosses of dendrobium require 4 - 6 months growing time in pots or plug trays before they can be sold or shifted into a larger pot or tray size

Media

After removal from the nursery stage, the most appropriate medium for growing dendrobiums is gravel stones ranging in size from 1½ - 2½ inches (4 to 6 cm), placed on the ground or in polybags/

pots (Plates 5 & 6). It is important to remove the smaller stones and fine particles that would impede drainage and aeration after roots have penetrated and occupied the spaces between aggregates.



Plate 5 Gravel bed planting of dendrobium plants



Plate 6 Dendrobium plants growing in gravel in 12-inch (30 cm) polybags

Spacing

A wide range of planting densities can be used for dendrobium cut flower production. However, the best practice is to plant between 15,000 - 22,000 plants/acre (37,000 - 54,300 plants/ha). Higher plant densities cause the plants to grow larger and the dense tangle of canes prevents good airflow. This will hinder adequate penetration and coverage of pesticides, and insect and disease control will become a problem. It will also result in a high percentage of bent, unmarketable sprays. Any number of patterns can be used for laying out the planting beds. The spacing of the beds and walkways depends on the spacing of the shade house supporting members, the length and width of the structure, and other infrastructure conditions. Typically, walkways are not less than 3 feet (1 m) wide, and beds are 3 – 6 feet (1 – 2.0 m) wide. The spacing of the plants in the beds is determined by the size of the bags or pots (if they are used), the size of the beds, the predicted life span of the plants, the availability of plants of appropriate size, and the plant density desired.

Planting

Plant dendrobiums into the field when they are about 12 inches (30 cm) tall. Plant orchids into beds of medium on the ground instead of individual containers. Using bed culture increases the

likelihood of disease spreading from plant to plant. In addition, it is more difficult to remove infected plants from bed culture than removing individually potted plants.

Alternatively, orchids can be planted into 12 – 18 inch (20 – 30 cm) bags in preference to hard plastic pots, which are more expensive. With either pots or bags, it is recommended that many large extra holes be added to the sides to ensure good drainage and aeration. Plants grown in containers can be spaced so that air can move between the root masses, allowing them to dry and thereby reducing the disease potential.

Irrigation

Irrigate orchids frequently for optimum production, especially during dry periods. Since dendrobiums are grown in porous media that hold little water, they should be irrigated whenever the media and root mass become dry. In dry, hot areas with gravel as a media, daily irrigation may be necessary. In humid, cooler areas, irrigation may be done once to three times per week, depending on the season and weather.

Fertilizer

After the young plants are hardened off and taken out of the flask for planting, they should be fertilized 10-14 days later with a dilute solution of soluble fertilizer once a week. Increase fertilizer application to twice a week after new roots and leaves appear. Use $\frac{1}{4}$ - $\frac{1}{2}$ strength of soluble fertilizer with a 1:3:1 or 1:3:2 ratio of nitrogen, phosphorus, and potassium (NPK).

As plants get larger and are replanted individually from pots or plug trays into gravel beds or larger pots, apply a controlled release fertilizer (1:1:1 ratio) supplemented with phosphate. Solid fertilizers should not be placed directly on the canes or leaves, where they could cause burns. Media should not be pre-mixed with fertilizers and kept in storage for a long period of time in moist conditions, because salts will leach out and build up in the media, possibly causing root burn upon planting.

Soluble fertilizers can be used in a fertilizer programme as a supplement as they supply NPK with micronutrients that plants need. Soluble fertilizers should be applied by spraying the solution onto the foliage until it runs off. Leaves and roots will absorb the fertilizer in solution.

Weeds


Weeds are a problem in orchid cultivation for several reasons; they harbour pests and diseases, compete for water and nutrients and may also compete for light. Weed roots encroach on the air spaces in the growing medium, which reduces drainage and aeration and may hasten the decomposition of organic media. Weeds should be removed early, before they set seeds, to avoid competition and prevent damage to orchid roots.


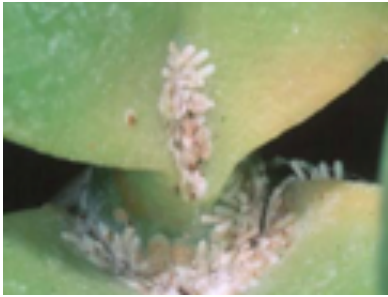


The area surrounding the facility should be kept practically weed-free, shoes and clothing should be inspected or changed before entering the growing area to avoid introduction of weed seeds. Ferns of any kind should not be grown in or near the production area because they are abundant producers of airborne spores. Organic potting media such as bark, coir, tree fern fiber, peat and sphagnum moss may contain weed seeds and spores and may need to be treated.




Pests and Diseases



Generally, insects, slugs, fungus, bacteria and viruses can affect orchid plants and flowers. To help control these pests and diseases, apply a good orchid insecticide, fungicide or bactericide monthly and keep air circulating around the plant. The major orchid pests and diseases, problems and their control are presented in Table 1.



Table 1 Causal agents, symptoms and control of pests and diseases of orchids



Diseases	Symptoms	Control/Management
 <p data-bbox="199 1770 529 1818">Plate 7 Two Spotted Mite (<i>Tetranychus urticae</i>)</p>	Suck chlorophyll from plants. Transmit plant diseases.	Use oil sprays. Remove host plants.



Diseases	Symptoms	Control/Management
 <p>Plate 8 Mealy bugs</p>	<p>Severely damages and kills seedlings and small plants.</p>	<p>Space plants for good air circulation. Use oil sprays. Apply insecticidal sprays.</p>
 <p>Plate 9 Scales</p>	<p>Severely damages and kills seedlings and small plants.</p>	<p>Space plants for good air circulation. Use oil sprays. Apply Insecticidal sprays.</p>
 <p>Plate 10 Aphids</p>	<p>Sucking sap from soft tissue, damage flowers, cause distortion and spread viruses.</p>	<p>Control ants, use oil or soap based sprays. Also apply contact or systemic insecticides.</p>
 <p>Plate 11 Caterpillars</p>	<p>Eat the plant.</p>	<p>Use stomach and contact insecticides.</p>

Diseases	Symptoms	Control/Management
 <p data-bbox="201 562 347 590">Plate 12 Loopers</p>	<p data-bbox="613 254 971 289">Eat flowers and new growth</p>	<p data-bbox="1029 254 1425 331">Use stomach and contact insecticides.</p>
 <p data-bbox="201 940 334 968">Plate 13 Thrips</p>	<p data-bbox="613 632 1013 793">Damage and distort foliage and flowers leaving white and brown streaks. Flower buds drop off.</p>	<p data-bbox="1029 632 1425 709">Use stomach and contact insecticides.</p>
 <p data-bbox="201 1602 412 1629">Plate 14 Snails and Slugs</p>	<p data-bbox="613 1005 1013 1125">Chew flower buds and open flowers. Leave a silvery trail on plant parts</p>	<p data-bbox="1029 1005 1425 1083">Use slug baits such as Metaldehyde or Methiocarb.</p>

Diseases	Symptoms	Control/Management
 <p data-bbox="201 569 581 617">Plate 15 Botrytis Blossom Blight caused by <i>Botrytis cinerea</i></p>	<p data-bbox="613 260 1010 667">Small, brown necrotic spots on orchid flowers. Those spots may increase in size and number as the infection progresses, and may be surrounded by a pale pink margin. In severe infections, the spots can coalesce, and grey, webbed fungal growth (mycelium) may become visible.</p> <p data-bbox="613 722 1010 751">Also flower drop may occur.</p>	<p data-bbox="1029 260 1425 499">Manage moisture levels by protecting flowers from rain and prolonged exposure to dew. Solid covering of structures, good ventilation and air movement.</p> <p data-bbox="1029 554 1425 751">Reduction of inoculum levels such as the removal of old, infected, decaying leaves and flowers. Practice good sanitation measures.</p> <p data-bbox="1029 806 1425 1003">Also use appropriate fungicides. Always check pesticide labels for rates and comply with legal application procedures.</p>
 <p data-bbox="201 1373 581 1402">Plate 16 Colletotrichum Flower Spots</p>	<p data-bbox="613 1064 1010 1094">Flower drop.</p>	<p data-bbox="1029 1064 1425 1304">Manage moisture levels by protecting flowers from rain and prolonged exposure to dew. Solid covering of structures, good ventilation and air movement.</p> <p data-bbox="1029 1358 1425 1556">Reduction of inoculum levels such as the removal of old, infected, decaying leaves and flowers. Practice good sanitation measures.</p> <p data-bbox="1029 1610 1425 1808">Also use appropriate fungicides. Always check pesticide labels for rates and comply with legal application procedures.</p>

Diseases	Symptoms	Control/Management
 <p data-bbox="201 564 542 617">Plate 17 Phytophthora Blossom Disease caused by <i>phytophthora nicotianae</i></p>	<p data-bbox="613 254 1010 373">Spots and blights on blossoms generally soft and water soaked and may have irregular edges.</p>	<p data-bbox="1029 254 1425 499">Manage moisture levels by protecting flowers from rain and prolonged exposure to dew. Solid covering of structures, good ventilation and air movement.</p> <p data-bbox="1029 552 1425 751">Reduction of inoculum levels such as the removal of old, infected, decaying leaves and flowers. Practice good sanitation measures.</p> <p data-bbox="1029 804 1425 1003">Also use appropriate fungicides. Always check pesticide labels for rates and comply with legal application procedures.</p>
 <p data-bbox="201 1373 584 1425">Plate 18 Phyllosticta Blossom Spot caused by <i>Phyllosticta capitalensis</i></p>	<p data-bbox="613 1062 1010 1262">Not noticeable in the early disease stage. Entire petals darkened by fungal growth in the advanced stage of the disease.</p>	<p data-bbox="1029 1062 1425 1308">Manage moisture levels by protecting flowers from rain and prolonged exposure to dew. Solid covering of structures, good ventilation and air movement.</p> <p data-bbox="1029 1360 1425 1560">Reduction of inoculum levels such as the removal of old, infected, decaying leaves and flowers. Practice good sanitation measures.</p> <p data-bbox="1029 1612 1425 1812">Also use appropriate fungicides. Always check pesticide labels for rates and comply with legal application procedures.</p>

Diseases	Symptoms	Control/Management
 <p>Plate 19 Blossom Flecks caused by <i>Alternaria alternate</i></p>	<p>Tiny brown or black spots on the petals.</p>	<p>Manage moisture levels by protecting flowers from rain and prolonged exposure to dew. Solid covering of structures, good ventilation and air movement.</p> <p>Reduction of inoculum levels such as the removal of old, infected, decaying leaves and flowers. Practice good sanitation measures.</p> <p>Also use appropriate fungicides. Always check pesticide labels for rates and comply with legal application procedures.</p>
 <p>Plate 20 Bacterial Disease caused by <i>Erwinia chrysanthemi</i> and <i>Pseudomonas gladioli</i> pv. <i>gladioli</i></p>	<p>The outside of diseased canes is yellow to brown, while the insides are greenish yellow to brown. Diseased leaves and canes have a foul odour. Mature canes infected with bacteria are often soft and mushy. Eventually, diseased canes become weakened, brittle, and hollow, poor growth, stunted plants, few new shoots, small shoots, few small or incomplete spikes (floral sprays with missing flowers); and early decline in productivity of the crop.</p>	<p>Use clean planting material. Adopt good sanitation practices by removing all leaves, stems, roots, and flowers from diseased plants in the nursery site and field. Regulate moisture levels. Control pests and slugs. Use resistant varieties if available.</p>

Diseases	Symptoms	Control/Management
 <p data-bbox="201 569 581 617">Plate 21 Black Streak Disease caused by Cymbidium mosaic</p>	<p data-bbox="613 254 1008 541">Within 6 months after infection, black spots and streaks sometimes appear on the underside of the older infected leaves. Necrosis in the youngest leaves usually appears only in very severe cases.</p>	<p data-bbox="1031 254 1424 331">Rouging and destruction or isolation of diseased plants.</p> <p data-bbox="1031 380 1424 499">Protection of healthy plants from infection through virus-carrying insects.</p>
 <p data-bbox="201 968 581 1016">Plate 22 Cattleya Flower Breaking caused by <i>Ondontoglossum grande</i></p>	<p data-bbox="613 653 1008 814">Variegation. Malformation of the floral parts such as rolling and twisting of the sepals and petals.</p>	<p data-bbox="1031 653 1424 730">Selection of virus-free propagation stock.</p> <p data-bbox="1031 779 1424 856">Rouging and destruction or isolation of diseased plants.</p> <p data-bbox="1031 905 1424 1024">Protection of healthy plants from infection through virus-carrying insects.</p>

Good Agricultural Practice (GAP) related to the use of pesticides, requires farmers to maintain up to date records on the application of pesticides to the crop. These records should include trade names, application rates and dates of application. During the harvesting period use pesticides with a very short harvest interval.

Harvesting/Maturity

Sprays are usually harvested when 70–75% of the lower flowers are fully open. This stage of harvest helps to ensure opening of the remaining. Sprays may also be harvested with only half of the flowers opened if the market dictates. Harvest in the early morning or late afternoon, and avoid harvesting during the hot midday periods. Sprays are harvested by using a cutting tool. The possible spread of viruses must be considered, and strategies must be implemented to reduce or prevent this. Use household bleach solution and dip the tool after harvesting each plant.

Post Harvest Handling

After harvesting, sprays should be immediately placed in clean buckets filled with clean water, with the cut ends submerged about 5 - 8 inches (12 – 20 cm). Buckets should be cleaned thoroughly each week using bleach or another disinfecting solution. The water in these buckets should be replaced daily. The sprays are then taken to a cool, shaded packing area. Mist or spray flowers lightly with water misting or water sprays, which is better than soaking them, because pathogenic fungal spores and bacteria can contaminate flower sprays in a water bath.

Grade sprays according to and bundled in sets of 5, 6, 10, or 12 sprays, as determined by the customer. A rubber band is used to hold the bundles in place, and the ends are re-cut, sometimes under water. A water-soaked cotton ball is placed around the stem ends and covered with a small clear polyethylene bag, which is secured with a rubber band. Sleeve each bundle in clear plastic, which may have micro perforations that allow the sprays to “breathe.” Excess water on the blossoms or the packing materials increases the chances for fungal and bacterial growth. Sprays should be packed with minimum free water on them. Packing and insulating materials should also be dry.

Boxes are usually used for packing sprays. They range in size from small gift boxes to large cartons. Packing materials should include sheets of newspaper lining the boxes and newspaper shreds used to cushion bundles, especially on the stem ends. Flower bundles must be packed firmly to prevent movement and damage in transit. Box edges should be completely sealed with tape to prevent insects from crawling into the box after packing.

Transport

Sprays may be dipped in an approved insecticidal solution for insect disinfestation and plant quarantine security before shipping. Flowers are usually shipped by air to the export market.

Storage

Avoid storing or placing sprays near ethylene producing sources such as injured plants, ripening fruits and vehicle exhaust, as the ethylene gas released will age sprays prematurely. Upon receipt

of cartons by customers, flowers should be immediately unpacked and the stems should be re-cut under water. They should not be exposed to temperatures of 50°F (10°C) or lower for more than 4 days. Storage of sprays at 70 - 85°F (22 - 30°C) with high relative humidity will extend vase life and flower quality. The vase life of orchids is 10-20 days.

APPENDICES



APPENDIX I: TEMPLATE FOR COST OF PRODUCTION ANALYSIS: DENDROBIUM ORCHIDS

	Input	Quantity	Units	Unit Cost	Total Cost
1.	Nursery				
	Seedlings/clones				
	Flasks/ media				
	Pots/plug trays				
	Pot media (e.g. perlite etc.)				
	Organic media (e.g. peat, moss etc.)				
	Liquid fertilizer				
	Water				
	Total cost for nursery				
2.	Growth media				
	Pots/polythene bags and/or media				
	Cost for growth media				
3.	Crop maintenance				
	Water				
	Fertilizer (specify types used)				
	Pest and disease control (specify chemicals etc. used)				
	Total cost for crop maintenance				
4.	Harvest/storage				
	Bleach/disinfectant				
	Polythene bags/rubber bands/cotton balls/plastic wrapping				
	Boxes/packing material				
	Insecticidal dip				
	Estimate any utility costs				
	Transport to market				
	Total cost for harvest/storage				
5.	Labour				
	Nursery				
	Growth media				
	Crop maintenance				
	Harvest/storage				
	Total cost for labour				

Notes

1. It is recommended that the above data be completed on an annual basis.
2. The cost of any fixed structures should be considered. For example if a structure is solely used for anthurium production in the year and is expected to last for 10 years, then one tenth of the cost of construction (plus any annual maintenance) should be added at item 7.
3. The revenue obtained from sale of the crop should be compared with the cost of production to determine the profit/loss on the operation.

APPENDIX II: LIST OF RECOMMENDED PESTICIDES AND APPLICATION RATES

INSECTICIDES	APPLICATION RATE
Pronto 35 SC	3 - 5 teaspoons/gallon of water
Target	1 - 2 teaspoons/gallon of water
Pirate	½ - 1 teaspoons/gallon of water
Fastac	1 - 2 teaspoons/gallon of water
Caprid	½ - 1 teaspoon/gallon of water
Diazinon (Basudin)	¾ - 1½ pints/acre
Admiral	¼ teaspoon/gallon of water
Dipel	1½ - 2 teaspoons/gallon of water
Aza-direct	1 - 2 teaspoons/gallon of water
Cure	½ - 1 teaspoon/gallon of water
Danitol	1 - 2 teaspoons/gallon of water
Cypro	½ tablespoon/gallon of water
Dimethoate (Perfection, Rogor 40)	1 pint/acre
Phosvel	1¼ - 2 pints/acre
Orthene	3.2 ounces/acre
Permethrin (Ambush)	½ teaspoon/gallon of water
Padan 50 WSP	2 - 3 teaspoons/gallon of water
Lannate	1 teaspoon/gallon of water
Decis	½ teaspoon/gallon of water
Kelthane 42%	1¼ lb/acre
Orthene 75S	1 lb/acre
Malathion	½ - 1 pint/acre
Sevin	1½ lb/acre
BT (<i>Bacillus thuringiensis</i>)	Label rates
Rotenone	1 - 2 teaspoons/gallon of water
Neem X.	8 - 10 oz/gallon of water
FUNGICIDES	APPLICATION RATE
Bellis	2 teaspoon/gallon of water
Acrobat	2 - 4 teaspoon/gallon of water
Mancozeb (Dithane M45)	1.5 lb/acre
Cabendazim	2 teaspoon/gallon of water
Daconil	1½ - 2 pints/acre
Benomyl (Benlate)	6 oz/acre
Captan	2 - 3 teaspoons/gallon of water
Peltar	3 teaspoons/gallon of water
Manzate DF	2 - 4 teaspoons/gallon of water
Bravo	1½ - 2 pints/acre
Tri-Miltox-Forte	3 teaspoons/gallon of water
Botrilex	5 - 200 lbs/acre
Kocide 101	2 - 4 teaspoons/gallon of water
Cupravit	2½ lb/acre

APPENDIX II: LIST OF RECOMMENDED PESTICIDES AND APPLICATION RATES

WEEDICIDES	APPLICATION RATE
DCPA (Dacthal W-75)	10 lb/acre
Diphenamide	4 - 10 lb/acre
Paraquat (Gramoxone)	1 - 2 pints/acre
Dymid 80W	5 lb/acre
Atrazine 80 (Gesaprim).	1¼ - 1½ lb/acre
Linuron (Lorox)	1 pint/acre
Prometryn (Caparol)	0.8 - 1.6 lb/acre
Sethoxydim (Poast)	1¼ - 3½ lb/acre
Clethodim (Select)	0.094 - 0.25 lb/acre
Prometryn 50WP (Geagard)	2 - 3 lb/acre
Herbicidal Oil (Stoddard Solvent, Kerosene oil)	40 - 80 gallons/acre

APPENDIX III: GOOD AGRICULTURAL PRACTICES DATA RECORD SHEET

Grower name:							
* Name of applicator	Date	Brand and product name	Rate	Size of area/no. of plants treated	Total application (amount of the product used)	Notes/target pest	Start/finish time

*The applicator should be trained or, if not, supervised by a trained or certified person. Proof of training required

