

REDUCING THE COST OF WEED
MANAGEMENT IN CONTAINER
NURSERY PRODUCTION

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OVERVIEW OF THE OPERATION AT IMPERIAL NURSERIES

- Located in Granby CT., 15 mi NW of Hartford.
- Approx. 225 acres container grown crops.
- Over wintering hoopouses constructed in pairs. 14 ft. wide with 3 ft. aisle between.
- Product line includes:
 - rhododendron, broadleaf and needled evergreens, deciduous shrubs, ornamental trees, perennials and roses.
 - 30 acre field grown liner production.
- Business also includes a 400 acre container growing facility in Quincy FL.

INTEGRATED WEED MANAGEMENT PROGRAM

■ STARTING POINT:

- Over wintering structures (hoophouses) in CT.
- Traditional herbicide applications with hand-held rotary spreaders.
- High cost of weed control and hand weeding that alone averaged \$800/A in 1999.
- Weed control was fair.

■ INTEGRATED FACTORS:

- Master plan.
- Sanitation:
 - Non crop seed source control.
 - Escape weed control & hand weeding.
- Herbicide selection.
- Immediate treatment of newly potted plants.
- Efficient application methods.
- Experimental work.

NON CROP CONTROL

- Boom-application early spring on the sides of hoopouses.
- Backpack - application on the aisles in early spring.
- Second, third and if fourth applications are covered by high clearance boom.
- Spot treatments 2 to 3 time a year.

NON CROP BOOM SPRAYER

- FMC 100 gal tank.
- One side boom with 4 nozzles.
- Nozzle type 8004-VS , spaced at 40 inch.
- 50 gall/A at 3 mph.
- Used Simazine 4L 4 qt/A + Surflan A.S. 4 qt/A, or Sureguard 12 oz/A.
- Used in early Spring for non crop application on the expanded areas of the houses.
- Used throughout the season for non crop applications.



Non-crop boom sprayer

ESCAPE WEED CONTROL & HAND WEEDING

- **Before each herbicide application - hand weeding is done.**
- **Hand weeding, not more than 1-2 days prior to scheduled applications.**
- **If for any reason weeds are ready to seed before scheduled application, weeds are pulled and half rate of preemerge herbicide applied.**
- **No post emerge application needed or done.**

BACKPACK FOR NON CROP AREAS

- Used for non crop application on the aisles between two hoop houses and other areas.
- Nozzle used, 8004-VS
- Pressure 20 PSI.
- Speed 3 ft/sec.
- Used:- Roundup-Pro + Simazine, or
 - Roundup-Pro + Surflan and Barricade
 - Gramoxone Max + Simazine,
 - SureGuard, etc.

IMPROVED SYSTEM TO APPLY HERBICIDES WAS NEEDED:

- **In 1999 all herbicides applied by hand cranking granules.**
- **Precision and uniformity of application was poor.**
- **High cost:**
 - **labor requirements for application were high.**
 - **granular herbicides that were used very expensive.**

EVOLUTION OF HERBICIDES PROGRAM

- 1999: - All granular applications by hand.
- 2000 - 2001:
 - March - April, - one backpack spray.
 - May - Aug, - overhead boom.
 - Sep - Nov, - hand cranking of granules.
- 2002:
 - Fall granular now applied with Orbit-Air.
- 2003 - 2005: - Fine tune the program.

CURRENT PROCEDURE 2005

Application timing	Method
First, - Spring, before plastic removal, or day after potting.	Backpack spray
Second, third, or fourth 8 – week intervals	High clearance boom
Last, - Fall	Orbit-Air, granules

PROGRAM NOW INVOLVES

- Gallery 75 DF – 1 lb/A plus:
 - Barricade 4 FL 21 oz/A; or
 - Surflan A.S. / Oryzalin 2 qt/A,
(three times a season).
- SureGuard (two application/year, labeled plants only).
 - followed by:
- OH-2 granules in Fall.
- Special herbicide plan for perennials and field grown liners.

TREATMENT PROTOCOL FOR SPRAYING

- Wet foliage – dew or 5 to 10 minutes irrigation.
- Spray.
- Irrigate ASAP 20 - 25 minutes to wash off herbicides.
- Wind not more than 5-10 mph.

TREATMENTS ON NEWLY POTTED PLANTS

- **Backpack spray with a KLC-5 nozzle.**
- **Apply next day or not more than 48 hours after potting.**
- **Backpack spray - very flexible to use after potting.**

FIRST APPLICATION - BACKPACK

- Start before the plastic covers are removed in spring.
- The hoophouses are vented.
- We use backpacks equipped with a KLC-5 nozzle, (Spraying System Co).
- Spray swath 14-ft.
- Two passes at 3 ft/sec speed.
- We apply 14 gal/A.



First pass with backpack spray



Second pass with backpack spray



KLC-5 nozzle - for backpack spray

50 GAL-TANK MIX

- Used for mixing herbicide solution for backpack applications.
- Hydraulic agitator.
- When the solution inside, the pump is on.



50 gal – Tank Mix

TWO-SECTION HIGH CLEARANCE BOOM

- Used for 2nd , 3rd and if, 4th applications.
- Very productive, can spray over 35 acres per day.
- Is operated by two people (one driver and a helper).
- Another person needed to turn irrigation on and off.

TWO-SECTION HIGH CLEARANCE BOOM

- Mounted on a John Deere 6000 tractor.
- Fabricated out of extruded aluminum.
- Equipped with Turbo FloodJet nozzles
- (TF-5, Spraying System Co)
- Spaced at 40 inch.
- Spray width up to 101 ft.
- Can spray 50 or 25 ft. width.
- At 2 mph the sprayer applies 50 gal/A.
- Tee Jet 844 Sprayer Control.



The boom width 101 feet



Spraying with the boom



Turbo FloodJet Nozzle, TF-5

ADDITIONAL ADVANTAGES TO HIGH CLEARANCE BOOM

- **Precision application.**
- **Applications made when conditions are the best, - low wind, wet foliage -.**
- **Greatly reduced treatment times.**

FALL – GRANULAR APPLICATION ORBIT-AIR, GANDY SPREADER

- **Used a Gandy Orbit-Air model 64FS12.**
- **Mounted on a tractor bucket loader.**
- **Pass over single rows of 14-ft hoop houses.**
- **Capacity 350 lbs.**
- **Computerized control of rate.**
 - **Raven Monitor-controlled Orbit-Air.**
 - **Electric speed controlled monitor system by Raven.**
- **Can cover over 10 acres per day.**



Orbit - Air Spreader



Orbit-Air spreader



Test for the uniformity of application





Hand crank granules

HAND CRANKING OF GRANULES VS. ORBIT-AIR SPREADER AT DESIRED RATE OF 120 lb/A OF OH-2

Method	Rate range for (lb/A)	Variability
Spyker, hand cranking	91 to 153	49 %
Orbit-Air	111 to 136	18 %

MAN-HOURS SPENT ON FALL GRANULAR APPLICATIONS

Year	Method of Applications	Hours worked for 130 acres	Savings (%)
2001	Spyker (Hand cranking)	725	0
2002	Orbit-Air	283	61
2003	Orbit-Air	210	71
2004	Orbit-Air	223	69

TREATMENT PROTOCOL FOR GRANULAR APPLICATIONS

- **Dry foliage.**
- **Irrigate 20 – 25 minutes, to wash off the granules.**
- **Wind not more than 5 - 10 mph.**

PAST OR CURRENT EXPERIMENTAL WORK AT IMPERIAL NURSERIES

- **Evaluation of sprayable herbicides for container-grown ornamentals.**
- **Herbicide for newly planted container-grown woody ornamentals.**
- **Longevity of weed control with herbicides for ornamental containers.**
- **Tolerance of deciduous shrubs to fall applications of herbicides on mature senescing foliage.**
- **Evaluation of new herbicide 'Showcase'.**
- **Goal 4F vs. Goal 2XL on containers.**

RESULTS FROM EXPERIMENTAL WORK

- Find solutions for plants that are not on the herbicide labels.
- Include more plants on the master plan.
- Switching plants from granular into liquid applications.
- Find more effective and less expensive herbicides.

REPLACING STANDARD APPLICATIONS WITH SUREGUARD

- **Used on 15 acres of Dwarf Alberta Spruce.**
- **2 applications for the season.**
- **Applications done in 12 week intervals.**
- **Standard spray program for the season:**
 - **2 application, Gallery 75 DF+ Barricade 4 FL**
 - **1 application Gallery 75 DF + Surflan A.S.**
 - **application every 8 weeks.**
- **Weed control very good.**

COST OF SUREGUARD VS. STANDARD APPLICATIONS

Herbicide	Rate per acre	\$ per acre	No. of applications per season	Total \$	\$ per season
<i>Gallery + Barricade</i>	<i>1 lb/A 21 oz/A</i>	<i>134.5</i>	<i>2</i>	<i>269</i>	<i>Standard</i>
<i>Gallery + Surflan</i>	<i>1 lb/A 2 qt/A</i>	<i>135.5</i>	<i>1</i>	<i>135.5</i>	<i>404.5</i>
SureGuard	10 oz/A	59.4	2	118.8	118.8 (29 %)

COST OF LIQUID APPLICATIONS VS. GRANULAR APPLICATIONS

Herbicide	Applic. method	Rate per acre	\$ per acre	<i>Average \$/A</i>
OH-2	Granular	120 lb	208	<u><i>granular</i></u>
Ronstar G + Devrinol 2G	Granular	150 lb + 200 lb	487	297
Snapshot 2,5 TG	Granular	150 lb	195	
Gallery + Barricade	Liquid	1 lb + 21 oz	135	<u><i>liquid</i></u>
Gallery + Surflan	Liquid	1 lb + 2 qt	136	110
SureGuard	Liquid	10 oz	59	63 % savings

LABOR FOR GRANULAR AND LIQUID APPLICATIONS

Methods	Man-hours per acre	<i>% savings</i>
Hand crank granules	5.58	<i>0</i>
Orbit-Air spreader	2.19	<i>61</i>
Backpack sprayer	3.46	<i>38</i>
High clearance boom	1.35	<i>76</i>

MAN HOURS FOR HAND WEEDING

Year	2001	2002	2003	2004
Man-hours for hand weeding	15,297	11,566	6,380	6,350

- Acers and Nr. of plants grown almost the same.
- \$ spend for herbicides for every year stay almost flat, when the price for herbicides every year goes up.
- \$ spend for labor applications goes down. when the salary every year goes up.

BOTTOM LINE – COSTS PER PLANT AT IMPERIAL NURSERIES

Year	1999	2001	2002	2003	2004
Weeding labor in cents	3.7	3	2.3	1.3	1.3
Herbicides in cents	3.9	3.9	3.8	3.9	3.7
Total cents per plant	7.6	6.9	6.1	5.2	5
<i>% savings</i>	<i>0</i>	<i>9.2</i>	<i>19.7</i>	<i>31.6</i>	<i>34.2</i>

SUMMARY

- Sanitation – the cornerstone to any weed management program.
- Selection of herbicides for plants grown.
- Immediate treatment of newly potted plants.
- Efficient, precise application methods.
- All year long prevention.
- Liquid applications vs. granular.
- Experimental work very important.