

The Use of Parboiled Rice Hulls as Mulch Material for Weed Control on Ornamental Crop Production

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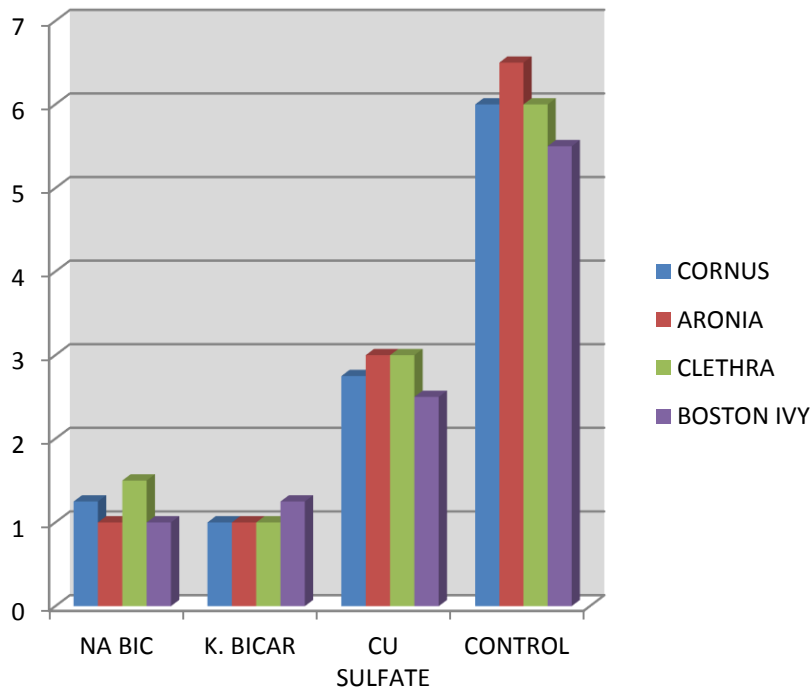
Van Belle Nursery



- Established 1973 in Abbotsford, BC
- Wholesale grower and propagator for North America
- Four growing sites: 100 acres total

2008 - Attempt No. 1 : Chemical

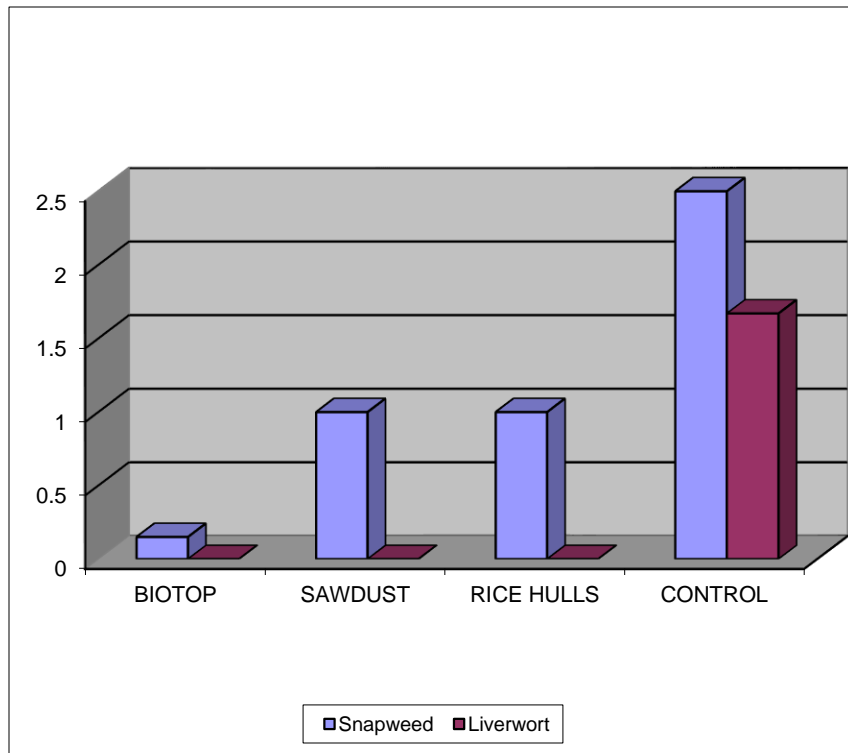
Liverwort control by spraying bicarbonate and copper salts



- Salt solutions affect pH and burn liverwort.
- Used and tested only on dormant plants.
- Good liverwort control for only two months.
- Only works on indoor conditions.
- Burns new buds and foliage upon reapplication.

2009 - Attempt No. 2: Mulch

Liverwort and bittercress control by creating a physical barrier



- Bio top forms a crust to keep the plants weed free. Produces a mold that attracts mice. Weeds grow when crust cracks.
- Sawdust: New weed seedlings germinate faster. Liverwort comes back after 3 months.
- Rice hulls: Weed seeds grow slowly. Liverwort does not grow.
- In general: Good liverwort control on all treatments; not satisfactory for bitter cress.

2010 - Attempt No. 3: Mulch and Preemergence Herbicide

Weed control by creating physical and chemical barriers

Broadstar G Rate: 168 Kg /ha
broadcasted over mulch in October

Broadstar G 168 Kg/ha broadcasted
over bare media in October



2010 - Attempt No. 3: Mulch and Pre-Emergence Herbicide

Weed control by creating physical and chemical barriers

Ronstar G. Rate: 168 Kg /ha
broadcasted over mulch in October



Ronstar G Rate: 168 Kg /ha broadcasted
over bare media in October



Herbicides alone are not the solution to control Liverwort and Bittercress

Broadstar G

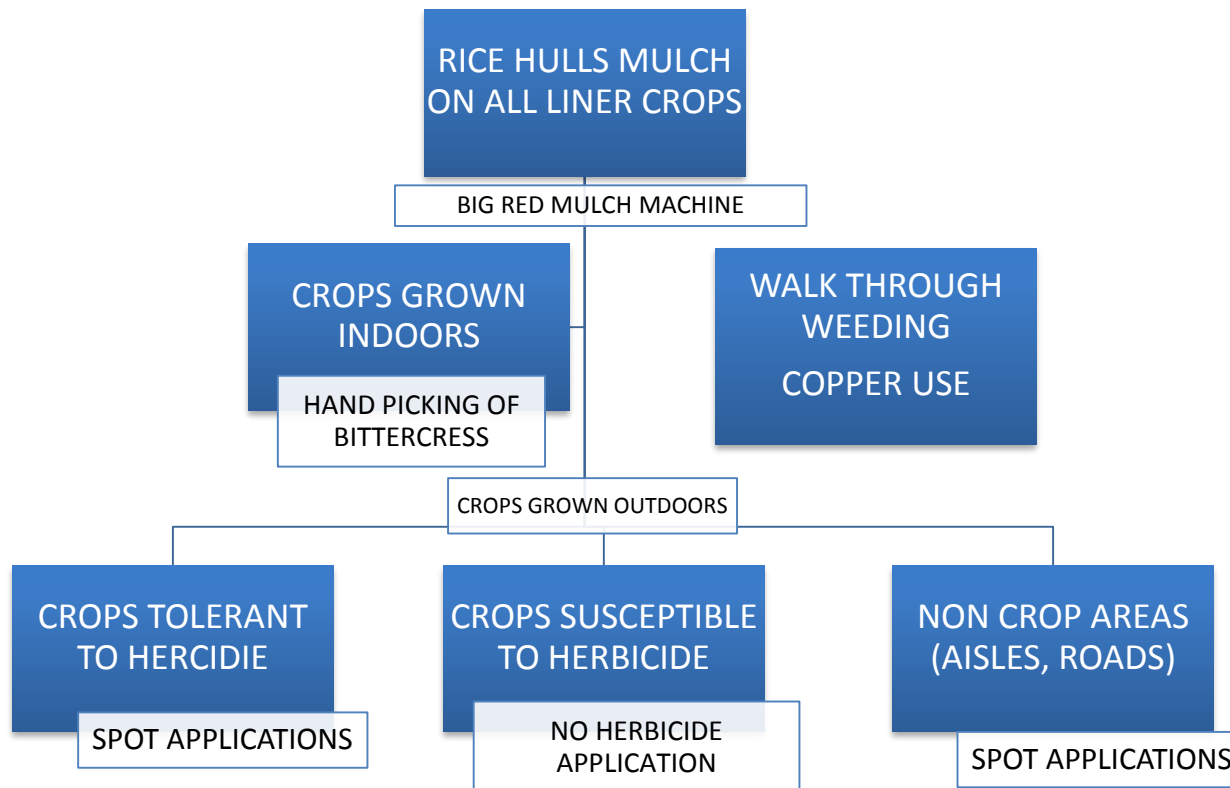
- Very good control on bittercress. High residuality in outdoor conditions.
- Liverwort comes back after the third month when applied alone.
- Affects plant growth and stunts susceptible plants
- Reduced phytotoxicity when broadcast over rice hulls.

Ronstar G

- Good control on bittercress and fair effect on liverwort.
- Less toxic and persistent than Broadstar under outdoor conditions.
- Reduced phytotoxicity on susceptible varieties when broadcast over rice hulls.

CURRENT WEED CONTROL STRATEGY

“Combination of Methods”



Economic Analysis of the Use of Rice Hulls for Liverwort Control

- PBH bale cost - \$66.00 CAD per yard
- 18,000 - 4" liners mulched with a yard of rice hulls
- Cost of mulch per plant: \$0.0036 CAD
- Labor: \$0.0026 CAD
- Total: \$0.0062 CAD
- Two applications of Ronstar G over tolerant crops (labor included): \$0.0038 CAD
- Hand-cleaning liverwort on crops susceptible to Ronstar or crops grown indoors at shipping time: \$0.022 CAD
- Sometimes cleaning heavy infestations of liverwort needs to be done twice in the growing cycle. Fertilizer and substrate is lost in the process.

CURRENT WEED CONTROL IMPLEMENTATION

Automation and Lean Production

2011: “Big Red” Mulch Machine



2015: Rice Hull Mulch Over
Rocketliner™ Trays



Additional Rice Hull Mulch Benefits:

- **Faster shipping process.** No liverwort cleaning.
- **Reduction of bittercress** germination and growth.
- **Moisture retention** in the lower layer; no retention in the upper layer.
- **No competition for nutrients** with the plant.
- **Source of Si, K, and P.**
- **Reduced herbicide phytotoxicity.** Slow release or carrier effect.



Rice hulls as Mulch for Indoor Container Production





Nursery Industry Rice Hull Use

USA: Willoway and Lowes Nurseries

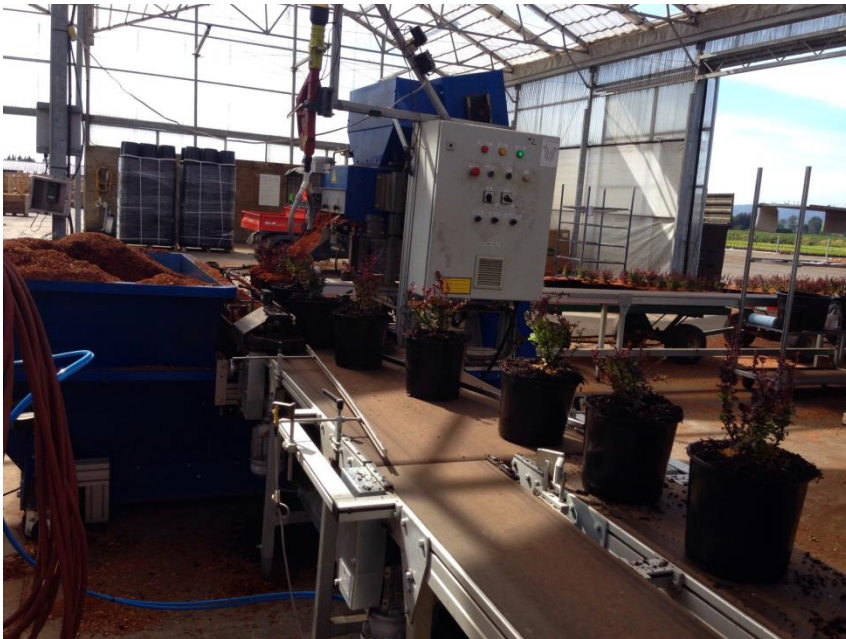
Holland: Van Son & Koot

Canada: Van Belle in BC/Abbotsford in QC



Cedar Sawdust as Mulch in Outdoor Container Production

Mulch and Herbicide at the
Potting Line



Growing Beds



What's Next?

Inconsistent and Uneven Weed Control Using Ronstar G



Poor Weed Control



Pretreating Mulch with Preemergence Herbicides

- Avoid reapplication of preemergence or postemergence herbicides.
- Use mulch as a herbicide carrier to slow release of active ingredient.
- Reduce phytotoxicity in susceptible crops
- Reduce herbicide run-off onto non-target areas.



Pre-Treating Mulch with Pre-Emergence Herbicides

One weed to control: Bittercress

Three susceptible deciduous shrubs:

- *Spiraea japonica*
- *Cornus stolonifera*
- *Hydrangea paniculata*

Two different mulch materials:

- Rice hulls
- Coarse cedar sawdust

Three herbicides registered in Canada for nursery use:

- Flumioxazin (Sureguard)
- Isosaxben (Gallery)
- Oxyfluorfen (Goal)



Thank You

- For more information please email diego@vanbelle.com