

Canadian Bulb Dip Trials With KleenGrow

Bulbs can be contaminated with a variety of plants pathogens including Fusarium and Penicillium. Fusarium is by far the most common from gladiolus to daffodils and tulips. Gladiolus and daffodil bulbs are routinely dipped in a heated solution of a fungicide - often chlorothalonil. This treatment reduces loss from superficial contamination with Fusarium (the fungicide) and internal contamination with Fusarium (the heat).

In 2004, Dr. Janice Elmhirst (Elmhirst Diagnostics & Research in Abbotsford, BC) conducted some trials on Kleengrow for its potential effects on Fusarium and Penicillium diseases that can be carried on contaminated flower bulbs. Dr. Elmhirst used commercially harvested bulbs (2 cultivars for Tulips and 1 cultivar for Daffodils). The bulbs were processed normally by the growers before they were dipped into KleenGrow at either 1 ml/liter or 2 ml/liter. The untreated control was not dipped at all. Dipped bulbs were then planted and the growth was evaluated. The first table shows results for the daffodils after 15 weeks.

This test clearly demonstrated that the 5 minute dip in KG at either concentration greatly (significantly) enhanced survival and reduced incidence



Fusarium on daffodils (above) and tulips (below)



Effect of KleenGrow (KG) dips on Daffodil growth and disease severity

Treatment	% survival	# with Fusarium	Height (cm)	# flowers
untreated	71 a	29 b	26 b	23 a
KG 1 ml/liter	95 b	5 a	31 c	32 b
KG 2 ml/liter	94 b	6 a	21 a	34 b

Numbers in the same column followed by the same letter are not significantly different.

of Fusarium on daffodils. The plants were taller in the 1 ml/liter dip but apparently the 2 ml/liter was too high as the plants were stunted. The number of flowers was significantly higher in KG dip treatments than in the untreated control bulbs.

The second crop tested was tulip and in this case, two cultivars were employed. The trial was conducted the same as the daffodil trial and results are shown in the table below.

Effect of KleenGrow (KG) dips on Tulip growth and disease severity

Treatment	Cultivar 1 - susceptible		Cultivar 2 - resistant	
	# diseased	Height (cm)	# diseased	Height (cm)
untreated	14	9.4 a	0	10 a
KG 1 ml/liter	3	8.9 a	0	14 b
KG 2 ml/liter	6	11.9 b	0	12 a

Numbers in the same column followed by the same letter are not significantly different.

Cultivar 1 was susceptible to Fusarium and Penicillium which was significantly reduced by both rates of the KG dip. In addition, the 2 ml rate improved plant height on cultivar 1. For cultivar 2 there were no diseased plants as this one is resistant to some bulb rots. The height of cultivar 2 was optimal at the 1 ml/liter rate.

Our plans are to continue this work on other bulbs/rhizome/corm crops including Calla lilies, Iris, Liatris, Allium, and hyacinth.

We are also considering expanding the work onto woody and herbaceous cuttings next year to better determine rates and use patterns.

One of the key things to determine for me it how often the dip solution must be dumped and started new to ensure that plant pathogenic fungi and bacteria are not transferred from bad bulbs or cuttings to good ones.

ARC

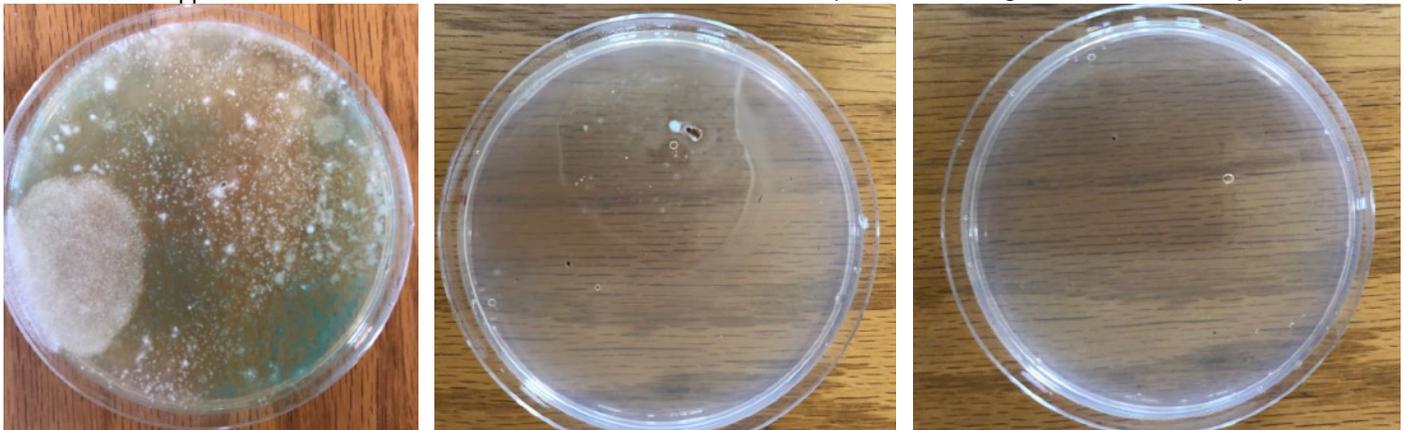
KLEENGROW BULB DIP TRIALS

We just completed a trial to evaluate safety and possible benefits of dipping bulbs in a KleenGrow (DDAC active ingredient) solution prior to planting. All plant materials were examined carefully and appeared healthy. Caladiums were obtained from Florida, gladiolus from Minnesota and lilies from California.

Bulbs were dipped (5 min) in water or water with KleenGrow (1 ml/liter = about 80-100 ppm DDAC) or KleenGrow (2 ml/liter = 200 ppm DDAC) at the rate of 25 bulbs per treatment. Lilies and caladiums were planted in 6 inch standard pots and top-dressed with fertilizer (19-6-12 Osmocote). Gladiolus were planted similarly except we used 6 inch azalea pots. A peat-based potting medium was used.

Caladiums were treated and planted on 6 July 2018 and placed in a greenhouse on benches. Lilies were treated and planted on 7 July 2018 and and Gladiolus were treated and planted on 13 July 2018 and placed in a greenhouse on benches.

At the end of each dip treatment, a small amount of dip solution was plated onto culture media. The images below (from left to right) are: water, KG-100 ppm and KG-200 ppm. These were from the Caladium dip solutions. Those from the other bulbs were similar in appearance.

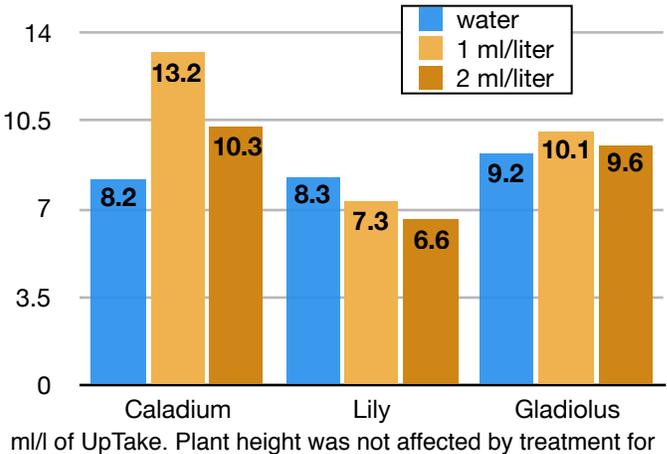


We also watched how fast the bulbs emerged and found that the gladiolus and caladiums emerged faster and grew better when dipped in KG (100 ppm) than when dipped in water or the KG (200 ppm). The Lilies appeared somewhat sensitive to the 200 ppm of the dip (graph below). DAT=days after transplant.

Overall, the 1 ml/liter UpTake dip was safe and produced the best plants at the initial rating.

By the end of the trial none of the treatments significantly affected the plant growth. The graph below shows final plant height in cm.

Plant height on Caladiums was best for the bulbs treated with 1



m/l of UpTake. Plant height was not affected by treatment for

the Gladiolus. Plant height on the lilies showed they were sensitive to the 2 ml/liter rate of Uptake and were significantly shorter than the water treatment.

Conclusions:

- Both rates of KleenGrow eliminated bacterial and fungal spores in the dip water after a 5 minute dip on all three bulb crops. This takes care of my well-known fear of contaminating healthy bulbs with diseased ones.
- Caladiums and lilies both emerged faster for those treated with 1 ml/liter of KleenGrow as a 5 minute dip.
- Lilies were somewhat sensitive to the 2 ml/l dip of KleenGrow that was eliminated by the end of the trial (about 3-4 weeks after dipping).
- Final top grade was not significantly affected by dip treatment at the end of the trial for any of these bulbs.
- The best rate of KleenGrow for the 5 min dip was 1 ml/l (=100 ppm DDAC)

