**Guidelines for TMV Exposed Greenhouse Operations**

**Because of past testing and widespread prevalence of Tobacco Mosaic Virus the Kansas Department of Agriculture has ordered through notice of regulatory action set forth in the Kansas Plant Pest and Agriculture Commodity Certification Act K.A.R. 2-2112 et seq., that all petunia plants and cuttings of the cultivars listed below be rogued and destroyed or a TMV containment program be instigated with the best management practices provided.**

Figure 1. TMV symptoms - twisted growth and leaf margins that are non-uniform.

**In option 1. These plants, lots, cultivars are considered all infected with the Tobacco Mosaic Virus and do not meet the Pest Freedom Standards (K.A.R. 4-15-10). No further testing will be required. *This action only applies to plant material imported into the US from Dummens, Las Mercedes plant in El Salvador (after week 51 or December 24, 2013) and rooting stations at Welby, Colorado and Timbuk, Ohio beginning in January of 2014*. Dummen is offering compensation for the plant material, you should contact Dummen what is required to meet this criteria.**

**The following are positive cultivars or associated names that have tested positive to TMV by the Kansas Department of Agriculture or Dummen. There may be more petunias from other brokers. The cultivars ordered destroyed are the following: Confetti pumpkin, Peppy Purple, Potunia plus papaya, Dark Red, Pumpkin Spice, Petunia Clash, Honey Bee Mine, Cotton Candy, Indian Summer, PetVeg potunia, PetVeg surprise, Surprise Neon, Surprise Neon, Surprise Queen Bee, Surprise Blue, Surprise Purple Ice, Sweetunia Bubblegum, Sweetunia Orange Flash, Sweetunia Blueberry Ice, Sweetunia Grape Ice, and Sweetunia Black Satin.**



Figure 2. Yellowing and mosaic of leaves

**When rogueing and disposing of plant material, it is important not to overload the bags to avoid spillage. Bagging should occur where the material is located at in the greenhouse and then transported to disposal bins. Material may also be buried on premises with at least a 24 inch top layer of soil. Plant material is not to be composted.**

**Option 2. TMV BEST MANAGEMENT PRACTICES: The lot tested negative by KDA staff but the petunia is listed on the cultivar positive list, then follow the guidelines:**

**Best management practices are designed to reduce the risk of TMV when a pathway has been discovered. TMV is one of the most easily mechanically transmitted viral diseases in horticultural and agronomic plant systems and can remain dormant for a long period exceeding one year in plant debris and as a contaminant on various surfaces found in greenhouses including door knobs, benches, tools, pots, etc…**

Figure 3. TMV mosaic and leaf clearing

**The following are best management practices that should be considered:**

* **Workers should wear good quality latex gloves when working with other petunia cultivars and change out with new cultivars and other species. Many petunias will not express symptoms and may be infected regardless of source or past handling so wearing gloves is always a good idea. Spraying plants with a 10-20% milk solution (see below) and working when leaf surfaces are wet also is recommended.**
* **Other petunia cultivars in close proximity (6 ft) to the above named lots should be isolated, scouted over three weeks, and tested for TMV before mixing with other species of plants or moving to new greenhouses or locations including all sales.**
* **Tools** **when being used in propagation and the maintenance of *all species* of plants should be dipped in a 20% solution weight to liquid (1:5 ratio) of non-fat dry fat milk every few minutes or between plants. It is recommended to keep this protocol intact for a significant period of time after discovery of TMV plants in a particular greenhouse**
* **Benches, shelving, etc... should be disinfested with trisodium phosphate (leave to dry for 2 hours at highest rate on label) or a 1:10 household bleach solution for 10 minutes then thoroughly rinse with water. Bleach solution needs to be fresh, it has a half-life of 2hr. Bleach is preferred because of higher efficacy but has safety issues so read label regarding skin, eyes, and poisoning. Door knobs should also be wiped down periodically in houses containing petunias. Alcohol solutions or cleaning pads or wipes are not an alternative.**
* **Workers should thoroughly wash hands with soap and water after working with petunias including rest and lunch breaks. Workers should not wear the same clothing on following days after working petunias till clothing is washed with detergent and dried.**
* **In mixed basket situations where TMV regulated plants have been planted. TMV plants are to be rogued according to KDA regulatory action notice. Non-petunia plants may replace petunia plants. This is a trade-off only for the situation where the grower has already invested time and supplies in planting “high end” hanging baskets before knowing that TMV petunias were an issue within the operation. There is no guarantee that transmission to the replacement plant will not occur but research indicates these measures are highly effective in limiting transmission. We are balancing the concerns of greenhouses to remain profitable but minimize exposure to TMV. How to proceed:** **A tarp should be laid on the ground or bench near the baskets to catch soil mix and debris as work is done. Growers should spray all plants in the basket with the milk solution before proceeding and then place the basket on the tarp. Remove all of the petunia including roots and debris. Then bag TMV plants in a garbage bag. Another worker then should follow planting the replacement with care to minimize injury. Then disinfect the floor area after removing petunias and transplanting new plants.**
* **Scout regularly Impatiens, verbena, calibrachoa, other petunias**
* **By not pinching/shearing a petunia or a confetti combination containing petunia during the propagation or finished stages you will minimize the chance for pathogen spread. Petunia and confetti growth can alternatively be controlled in the following ways: High light, cool growing and high fertility with low phosphorous fertilizers; apply B-Nine and Florel (2500 ppm and 300 to 500 ppm respectively) about two weeks after sticking when cuttings are rooted; at around 3 weeks after transplant, confetti with Aloha Calibrachoa (NOT Aloha Kona) respond well to a 1.0 ppm Bonzi, Paczol or Piccolo (paclobutrzol) drench; a late drench of 0.5-1.0 ppm Bonzi, Paczol or Piccolo (paclobutrzol) when plant has reached saleable size improves plant form. (Use drench volumes appropriate for container size.)**
* **It is recommended not to put petunias regardless of TMV status in the same house with tomatoes, peppers, eggplant, or other vegetable plants. Not all petunias exhibit symptoms although infected.**
* **Consider working with petunias at the end of the day then establish and follow a protocol of cleanliness.**
* **Kill and dispose of all weeds in greenhouses. Many are hosts for TMV.**
* **Contact your KDA area plant pest specialist of any suspects both with petunias and other concerns.**