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## Organic Control of Powdery Mildew in Winter Squash Crops

### Annual Report

Submitted by:

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In October of 2008 the Virginia Association for Biological Farming (V ABF) submitted a proposal entitled Organic Control of Powdery Mildew in Winter Squash Crops to the Specialty Agriculture Research Grant program which is operated by the Virginia Department of Agriculture and Consumer Services (VDACS), The proposal was approved for funding of \$18,600 for a two year project for field testing of organic fungicides that might be used to control powdery mildew (PM) and other cucurbit diseases,

In the Spring of 2009 field demonstrations in organic production of winter squash were established at five privately- owned farms and at Virginia State University's - Randolph Farm, The following winter squash varieties were planted at each location: Delicata, Kabocha Green - Black Forest, Kabocha Orange - Sunshine, Thelma Sanders Sweet Potato, Buttercup - Burgess and Sibley or Pikes Peak,

The cooperating farmers each received the following organic fungicides to use in controlling diseases that often reduce yields in winter squash crops: Serenade, Sonata, Oxidate and Kocide. Serenade and Sonata are biofungicides which use strains of *Bacillus subtilis* and *Bacillus pumilis* bacteria to control powdery mildew and other fungus diseases organisms. Oxidate and Kocide are natural contact fungicides which are approved by the Organic Materials Review Institute (OMRI) for organic production of winter squash. The cooperating farmers divided their winter squash field plots into four separate zones to test the effectiveness of these four natural disease control products.

All interested persons were invited to attend an educational field meeting at one of these demonstration sites in August of 2009. The locations, dates, times and cooperators were:

Rockingham County on August 5, 2009 at 6:30 pm with Calvin Nolt  
Mecklenburg County on August 18, 2009 at 6:30 pm with Mike Gilbert  
Chesterfield County on August 25, 2009 at 10:00 am with Andy Hankins  
King and Queen County on August 26, 2009 at 6:30 pm with Charlie Maloney  
Louisa County on August 27, 2009 at 6:30 pm with George Nolting  
Nelson County on August 31, 2009 at 6:30 pm with Gary Scott

There have been three unexpected developments in this winter squash project. About six weeks after the farmers planted seeds in their demonstration fields, we began to see infestations of an insect called the Squash bug. The squash bug, *Anasa tristis*, is common throughout the United States. The squash bug will attack all members of the cucurbit family but are most common on pumpkins and squash. Feeding, via piercing/sucking mouthparts, occurs primarily on the plant foliage. However, late in the season, squash bugs may also feed on fruit. The associated damage symptoms include wilting of leaves and ultimately results in leaves that appear black or dried out. We used the grant funds to order an organic insecticide called Spinosad. The growers at five of the demonstration locations achieved good control of the squash bugs using the Spinosad but the insects totally destroyed the winter squash crops growing at the trial in Mecklenburg County.

Another unexpected development in this project was the huge interest shown by the growers and by the consuming public in these squash varieties. At our field meetings, we spoke about the organic powdery mildew control products but at every meeting most of the participants were more interested in the seeing and tasting the six winter squash varieties. There certainly were differences in the susceptibility of the different varieties to Powdery mildew. The two Japanese Kabocha varieties: Sunshine and Black Forest resisted the disease very well. Thelma Sanders, Buttercup and Delicata exhibited moderate resistance to PM. The Sibley or Pike's Peak - Blue Hubbard variety was highly susceptible to PM.

Another unexpected and favorable development was the strong market demand for these winter squash that our cooperating growers found at every location. The winter squash sold well at farmers markets, to local restaurants and to the Whole Foods supermarket in Charlottesville. The two varieties that had the highest yields and the highest market demand were the Orange Kabocha – Sunshine and Thelma Sanders Sweet Potato. The only variety that had low yields was Sibley or Pikes Peak. We decided to replace that variety with Butternut in 2010. The Green Kabocha – Black Forest had lower yields and less market demand than the Orange Kabocha – Sunshine. We decided to replace the Green Kabocha- Black Forest with a red winter squash variety from France called Potimarron, in 2010.

In 2009, the Virginia Association for Biological Farming spent \$8,000 on this winter squash research/demonstration project which leaves \$10,600 in the budget for 2010. In 2010, we will invite ten landowners to establish these on-farm research trials. We will make sure that the trials are held in every section of Virginia including the Eastern Shore and Southwest, Virginia. Adding the four new cooperators, to the six locations we already have, will allow us to bring more impact to this project and spend all of the available funds. We found that the two most effective of the organic fungus control materials were Serenade and Kocide. We found that the two least effective materials were Sonata and Oxidate. We intend to replace Sonata and Oxidate with a sulfur product called THAT and another OMRI approved fungicide called Actinovate, in 2010.