**Crop Vulnerability Statement**

***Root and Bulb Vegetable Crop Germplasm Committee***

**July, 2005**

The Homeland Security Presidential Directive No. 9 (HSPD-9) from January 30, 2004 puts into place a national policy to defend US agriculture and food systems from terrorist attacks, disasters, and other emergencies. One of the aspects of this directive is the

establishment of a National Plant Disease Recovery System that insures that tools, infrastructure, and capacity can be met to mitigate the impact of significant plant disease outbreaks.

1) Degree of genetic uniformity of the standing crop

• Carrot has a highly diverse nuclear genome among major cultivars, but wide use of cytoplasm-genic male sterility could make for somewhat more uniformity in the mitochondrial genome. Although two cytoplasms exist for producing hybrids, U.S. carrot seed production and breeding relies almost exclusively on the petaloid type. To the extent that single cytoplasms are a concern for genetic uniformity, carrot would fall into a group that should be carefully watched.

• Garlic has relatively few clones in wide use, and is thus highly vulnerable, as was demonstrated with an outbreak of garlic rust several years ago. Until recently, no sexual crossing was possible and thus all clones existed as vegetatively-propagated germplasm. Among the four major crops covered by this Crop Germplasm Committee, garlic is perhaps the most vulnerable from a genetic uniformity point of view.

• Onion in the U.S. relies on a single cytoplasm for hybrid seed production. Thus, mitochondrial genome uniformity is likely quite high. Nuclear genome variability exists across U.S. onion germplasm. To the extent that single cytoplasms are a concern for genetic uniformity, onion would fall into a group that should be carefully watched.

• Table beet relies on a single cytoplasm for hybrid seed production, and this is the same cytoplasm used for sugar beet. Nuclear genome variation exists, although it is quite limited since very little effort is directed at table beet breeding in the U.S. All the sterile female lines in the U.S. (and worldwide) come from a single public program (Wisconsin) and share a high degree of genetic similarity. Most of the table beet production in the U.S. is handled with a few open pollinated and hybrid cultivars. To the extent that single cytoplasms are a concern for genetic uniformity, table beet would also fall into a group that should be carefully watched, particularly in light of the fact that the same cytoplasm is shared by sugar beet.

**2) An identification and rank of the highest impact crop diseases**

**Carrot**

Alternaria leaf blight

Root-knot nematodes (several species)

Pythium/cavity spot

**Garlic**

White rot

Nematodes

Rust

**Onion**

White rot

Onion maggot

Thrips

Fusarium

Pinkroot

Nematodes (as a group)

Iris yellow spot virus

Smut

Downy mildew

Botrytis (neck and leaf)

Bacterial rots of the bulb

Purple Blotch

Onion yellow dwarf virus

Rust

Reports of human diseases (E. coli-based) harbored in green onions suggests that fresh (probably not processed) onion could be a vector of human disease

**Table beet**

Rhizoctonia root rot

Cercospora leaf blight