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## Cornell University Research: Bulbs and Animals

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When the contract for the new research program was signed at Cornell University in 1998, I stated that, “Tulips are salad for deer”. Since then, deer damage has had a very significant impact on (especially) tulip sales in the northeast and other areas plagued by white tail deer. Particularly in the northeast, tulip sales have declining due to the ongoing deer problem. Researchers at Cornell University have been studying deer for many years and are working on ways to reduce the damage they cause. The leader of Cornell’s deer program is Dr. Paul Curtis. He is an expert in “nuisance animals” and conducts projects with deer, prairie voles (a small mouse-like creature), beavers and geese. What a job!

There is much interest in a safe and simple sprayable material to protect garden flowers and plants. Paul and I have been working together for the last year and a half to evaluate several commercially available deer repellent sprays for their effectiveness on bulbs. Additionally, Paul has trialed many of these products on a number of shrubs. The overall bottom line from all of this work is that repellent sprays based on the “rotten egg” smell are generally most effective at keeping deer damage to a minimum. Products such as “Deer-Off” and “Deer Away” generally repel deer for about 3-4 weeks when sprayed on plants according to directions. Thus, several sprays, spaced throughout the growing and flowering period will usually give good protection.

While sprays do work, they are not a totally acceptable solution and mean extra work for the gardener. An alternative approach is to ask the question: “What kinds of bulbs do deer like to eat, and which ones do they not like?”. Based on lots of garden experience, it is known that tulips are a favorite deer food while narcissus are not. Although little is known about deer feeding on the special bulbs, in my own yard *Fritillaria imperialis* and *Allium giganteum* have not been damaged, but crocus are at great risk when a deer passes by.

In the early days of the Flower Bulb Research Program, we had a project to assess feeding behavior of deer on a range of special bulbs. We hope to determine bulb species or cultivars that are not injured by deer, thus increasing success of these products in the landscape, especially in the northeast. With the help of the IBC, a range of specialty bulbs was selected. Bulbs were received in Ithaca in late October 1999 and planted into

15 cm pots and placed outside between the Cornell greenhouses. We had a mild fall, but by early December we had covered the pots with a side layer of microfoam (a flexible insulation about 0.5 cm thick) and 2 layers of plastic tarp. There were 64 pots of each bulb species or cultivar, and they were stacked in export crates, 4 layers high. Altogether, we had about 50 species and more than 3,000 pots in this experiment. The idea was to give natural winter cold then place these plants into the landscape in the spring and monitor deer feeding activity.

### **Results**

Unexpected but interesting results were obtained the week of March 6, 2000 when the bulbs were uncovered. During the winter, prairie voles (*Microtus ochrogaster*) took up residence in the stacks of export crates and had eaten more than 35% of the bulbs. We found two large nests of voles, and the youngsters were quite happy, well fed and growing fast from their nutritious meals of “bols and bizonder bolgewasen”. Of course, we were not happy with this, but we used it as an opportunity to learn some things about vole feeding and flower bulbs. In fact, we may be able to use the information below to help predict deer feeding because it is already known that voles have similar tastes as deer.

Below are some preliminary results on vole feeding on our bulbs. These notes should be useful as an initial guide to the likelihood of injury from voles in the landscape.

### **Hyacinth**

Blue Jacket, Carnegie and Pink Pearl were totally free of injury. Bulbs were not attacked and shoots were perfect when uncovered. At the time of uncovering, shoots were 2-4” tall. From this, we can conclude that hyacinths are pretty “immune” to attack from voles, and my own experience suggests that deer usually leave hyacinths alone.

### **Narcissus**

The cultivars Barrett Browning, Carlton, Geranium, Golden Harvest, Ice Follies, Minnow, and Tete a Tete were essentially free of injury. Voles dug in about 10% of the pots, but did not damage the bulb or emerging shoots. From this, we can conclude that daffodils are pretty “immune” to attack from voles, and practical experience indicates daffodils are also NOT a favorite deer food.

### **Tulip**

Angelique, Apeldoorn, Monte Carlo, Princess Irene, White Triumphator, *T. tarda* Dasytomon, *T. turkestanica*, and were in the trial. Voles dug in nearly 100% of all pots in the experiment. Bulbs of Angelique, *T. tarda* Dasytomon and *T. turkestanica* were totally destroyed. Bulbs of Apeldoorn, Monte Carlo, Princess Irene and White Triumphator were generally not damaged, but emerged shoots were heavily injured. There seems to be differences in vole palatability between cultivars.

**Special bulbs**

Special bulbs fell into 3 categories: 1) bulbs that were more or less immune to injury, 2) bulbs that were totally destroyed (perhaps these are the “favorite food”?), and 3) bulbs that were fed upon, but were not, apparently, the favorite food of the animals.

**Group 1: Bulbs that experienced little or no injury from voles:**

- Allium christophii
- Arum italicum
- Colchicum ‘Waterlily’
- Cyclamen coum
- Eremurus Ruitter Hyb.
- Erythronium 'Pagoda'
- Fritillaria imperialis ‘Rubra’
- Fritillaria persica
- Galanthus nivalis
- Iris reticulata ‘Harmony’
- Iris reticulata ‘J.S. Dijt’
- Iris reticulata ‘Pauline’
- Leucojum vernalis

**Group 2: Bulbs that were totally destroyed from vole feeding:**

- Camassia quamash
- Chionodoxa luciliae
- Corydalis solida
- Crocus 'Pickwick'
- Iris bucharica

**Group 3: Bulbs that were injured, but not destroyed, by vole feeding:**

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|----------------------------------|---|
| Allium spaerocephalon            | 30% digging, 10% bulb damage                                      |
| Allium aflat. ‘Purple Sensation’ | 100% digging, 25% shoot damage, no bulb damage                    |
| Allium caeruleum                 | 25-30% digging, 25% loss, but variable                            |
| Allium karataviense              | 90% digging, 10% bulb injury, 40% shoot injury                    |
| Allium moly                      | Some digging ± 10% injury   |
| Allium roseum                    | 50% digging, but variable: some pots 100% gone, others untouched. |
| Anemone blanda ‘Blue Shades’     | 75% injury  |
| Eranthis hyemalis                | digging in all, some injury, some still ok                        |
| Ipheion unifolium                | digging, 75% injury   |
| Iris hollandica ‘Blue Diamond’   | damage to upper one third of leaves                               |
| Scilla siberica                  | 100% digging, "100% tip chew"                                     |