Spinach Variety Trials

2004

The CSU Specialty Crops Program conducted a spinach variety trial during the summer of 2004 at the Horticulture Research Center northeast of Fort Collins, Colorado. Of interest were varieties of spinach that were bolting and blue mold resistant.

Thirty-one cultivars of spinach were evaluated. Spinach seed was sown on July 15, 2004 with a Nibex hand seeder. The seed was planted in a double row on a 30" bed and watered with drip irrigation.

Weed control was done by hand on Aug. 23, 2004 .There were three replications of 30 plants for each cultivar. Downy mildew pressure was minimal, and no disease management was implemented. Insect pressure was also minimal, and so no insect management was implemented.

The cultivars were scored immediately before harvest on Sept. 7, 2004. An experienced field harvest crew from GFF harvested the trial for bunches. The yield of each variety was recorded using number of bunches and weight. A scoring of the cultivars was calculated with weighted values assigned to the different parameters used for evaluation.

Parameters measured included: plant type (savoy to flat leaf), leaf width (narrow to wide), plant height, color, degree of bolting, blue mold presence, bunch strength, pack appearance, body, and ability to recover from crushing.

Since interest in the variety trials was primarily in the savoy and semi-savoy types, below are results on those cultivars grown that stood out as good performers. Blue mold (BM) and bolting pressures were low last summer, so any tendency in that direction is a concern if there are not management options available to control them.

Variety	Leaf Type	Notes
REGIMENT	savoy	Top Pick--Stands out as a very attractive plant, excellent in all categories, no BM or bolting
SPRINGER	savoy	excellent color and body, some bolting and BM

SPINNER	savoy	good performer, but arrow shaped leaves, no BM or bolting
FY 0284	savoy	BM and bolting may be an issue on this otherwise outstanding variety
XSPC 403	savoy	BM and bolting may be an issue on this otherwise outstanding variety
FY 0268	savoy	BM and bolting may be an issue on this otherwise outstanding variety
CORRENTA	semi-savoy	Looks pretty solid, but tendency to bolt
RX 6660 2028	semi-savoy	Stood out as one of the best looking plants and bunches, but showed some BM and arrow shaped leaves, yield was avg.
CHEROKEE	semi-savoy	Stands out as an attractive plant and bunch, yield fair
UNI PAK 151	semi-savoy	Good yield and performance, but tendency to bolt
UMBRIA	semi-savoy	Good yield, bunch and crush scores, one of the few not showing any BM or bolting
SPRINGFIELD	flat-semi-savoy	Stood out as an attractive plant and bunch, BM present, yield OK
AVENGER	flat-semi-savoy	Bolting knocks this one down
F 123	flat-semi-savoy	Good yield, and crush proof, but too arrow shaped

2005

Two evaluations of spinach varieties were conducted by CSU's Specialty Crops Program during the summer of 2005 at a private farm located north of Fort Collins. The first planting was sown on April 26, 2005 and harvested on June 28, 2005 representing a spring planting slot that included 31 cultivars of spinach. The second planting was sown on June 20, 2005 and harvested on August 17, 2005 representing a midsummer planting slot that included 35 cultivars of spinach. This second planting included the additional cultivars, Samish, Rembrandt, Remington and Indian Summer. The main objective of this trial was to evaluate a wide number of cultivars for spring and summer production. Somewhat ironically, the spring crop was exposed to summer-like stress immediately before harvest when temperatures in the upper 80˚s to lower 90˚s(F) coincided with an irrigation system breakdown that left the crop dry for several days at its peak ET. These early summer spikes in temperature are not uncommon in northern Colorado, and provided useful information about the tolerance of varieties under less than ideal production climate. Included in this report are yield and bolting resistance; two parameters which are very important to Colorado spinach growers.

Methods

The spinach trial fields received dairy manure applications of approximately 20tons/acre in the late fall of the previous year, and soil fertility was reported by the operators as "good". Both fields were irrigated by center pivot, using surface water. Irrigation scheduling was based on ET. However, immediately prior to harvest the first trial underwent severe stress due to high temperatures concurrent with a breakdown of the irrigation equipment. These stresses may have initiated premature bolting, and reduced leaf size and yields.

No pesticides or additional inputs were applied to the crops once sown. The fields were blind cultivated immediately before planting. After crop emergence the fields were tractor cultivated once and hoed twice. Weed pressure was very light.

Three replications of each cultivar were randomly assigned in a split plot design. Each replication was five feet long, and had two rows per bed spaced 10 inches between rows. Beds were spaced 40 inches apart. A Planet Junior planter was used to plant the seed providing in-row spacing of approximately 3 inches between plants. The fields were irrigated immediately after seeding, and maintained moist until emergence, at which time ET based irrigation scheduling was used. The plots were placed within spinach production fields, replicating production field environmental conditions and cultural practices.

An experienced field harvest crew hand harvested the trials bunching the plants for fresh market per industry standards. Immediately before harvest, each plot was inspected for bolting plants. Blocks that had many bolting plants were not harvested. Resistance to bolting was scored 0 to 5 in which 0 represented a replication whose plants were nearly all bolting and 5 represented a replication that had no plants bolting. Intermediate scores represented relative degrees of plants bolting. After being bunched, the yield of each variety was weighed and recorded on a mobile electronic scale. Only saleable spinach was harvested per market standards. Table 1 presents the cultivars grown, sorted by leaf type.

Click on variety for a picture taken during the trials.

Table 1: Spinach Cultivars Trialed - sorted by type

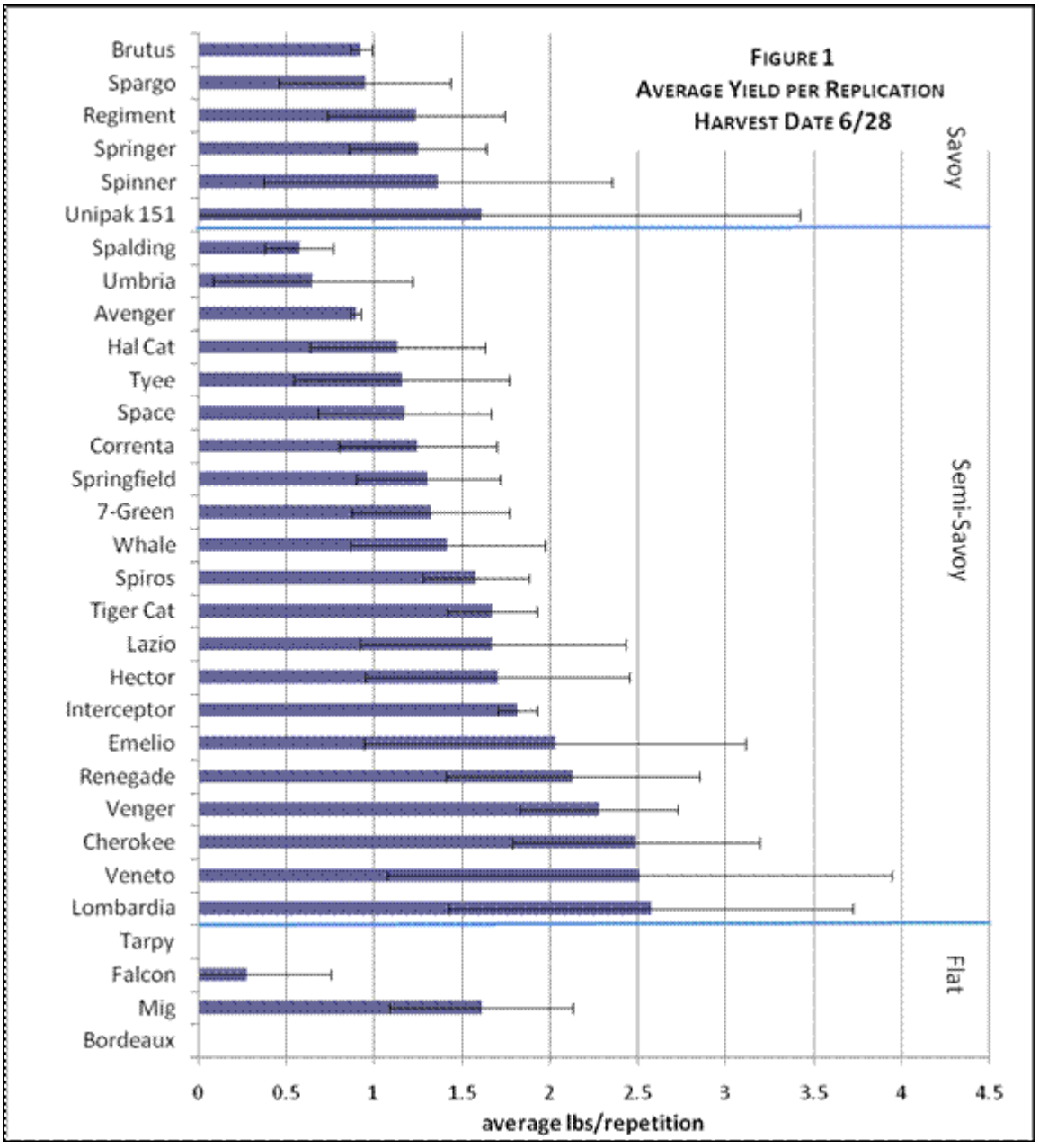
Savoy Type	*Semi-savoy type*	*Flat leaf*
Brutus	7-Green	Bordeaux
Indian summer	Avenger	Falcon
Regiment	Cherokee	Mig
Remington	Correnta	Samish
Spargo	Emelio	Tarpy
Spinner	Hal Cat	
Springer	Hector	
Unipak 151	Interceptor	
	Lazio	
	Lombardia	
	Rembrandt	
	Renegade	
	Space	
	Spalding	
	Spiros	
	Springfield	
	Tiger Cat	
	Tyee	
	Umbria	
	Veneto	
	Venger	
	Whale	

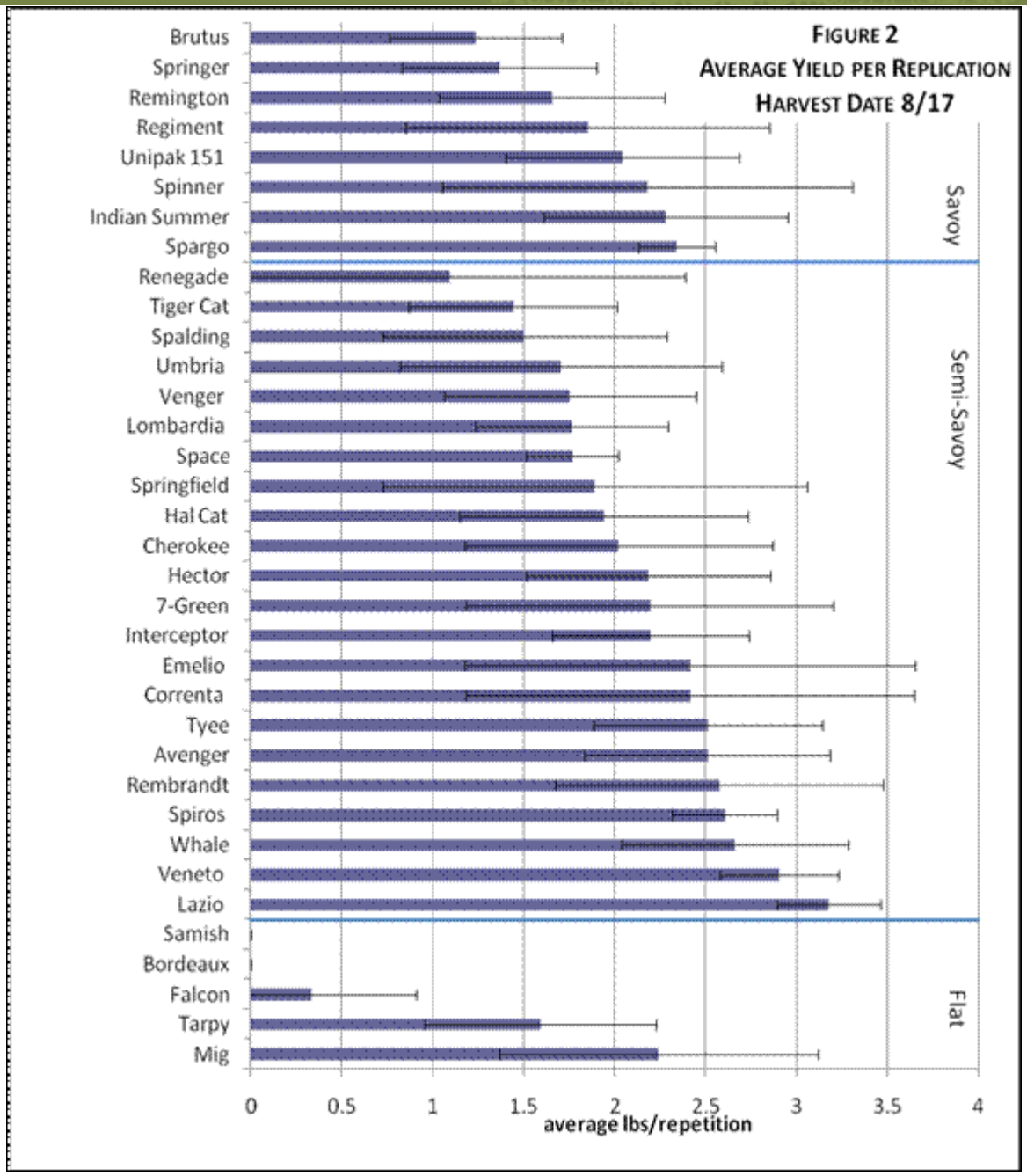
Measurements of Yield:

The cultivars were separated into three categories based on leaf type; flat leaf, semi savoy and savoy. There were yield differences between cultivars but significant differences existed only between the highest and lowest yielding cultivars (Figures 1, 2). The lack of significance was due to a high degree of variability within replications for each cultivar.

The crew harvested each replication using standard harvest techniques. The number of bunches and weights were

recorded on a mobile electronic scale. Only saleable spinach was harvested per GFF/market standards. Figures 1 and 2 show pounds harvested per replication of each cultivar from a four foot bed length. The error bars indicate the standard deviation of that variety. Caution should be used in extrapolation of these small plot yields to field scale estimates, remembering that these plots represent only 3/10,000 of one acre.





Observations on bolting resistance:

Figures 3, 4 and 5 report the resistance to bolting of spinach by savoy, semi savoy and flat leaf spinach planted on two dates. Resistance to bolting was scored as follows: 0=most plants bolting, 5= no plants bolting. Error bars represent standard deviation. There were differences in bolting resistance between the two planting dates. The differences were probably due to high level of heat stress experienced by the early planting during the week preceding harvest.

6/28 harvest date:

Flat leaf types:

- Mig resisted bolting.
- Tarpy, Bordeaux and Falcon were completely bolted at time of harvest.

Savoy types:

- Tyee, Unipak 151, Regiment, Spargo, Spinner and Springer all showed good resistance to bolting.
- Brutus showed bolting in at least one rep.

Semi savoy types:

- 7-GREEN bolted
- Space and Tiger cat bolted in at least one rep.
- No bolting occurred in these semi savoys: Renegade, Correnta, Cherokee, Interceptor, Spalding, Springfield, Spiros, Venger, Whale, Lazio, Umbria, Veneto, Lombardia, Emelio, Hector, Hal Cat, Avenger

8/17 harvest date:

Flat leaf types:

- Mig, Tarpy and to a lesser degree Falcon all resisted bolting.
- Bordeaux was completely bolted at time of harvest.

Savoy types:

- Indian Summer, Regiment, Spargo, Spinner and Springer all showed good resistance to bolting.
- Brutus, Remington showed bolting in at least one rep.
- Unipak 151 bolted.

Semi savoy types:

- Hal Cat, Emelio, 7-Green, were beginning to bolt in at least one rep.
- Samish bolted.
- All other semi-savoy varieties were free of bolting plants.

•

FIGURE 3
RESISTANCE TO BOLTING OF FLAT LEAF SPINACH ON TWO HARVEST DATES

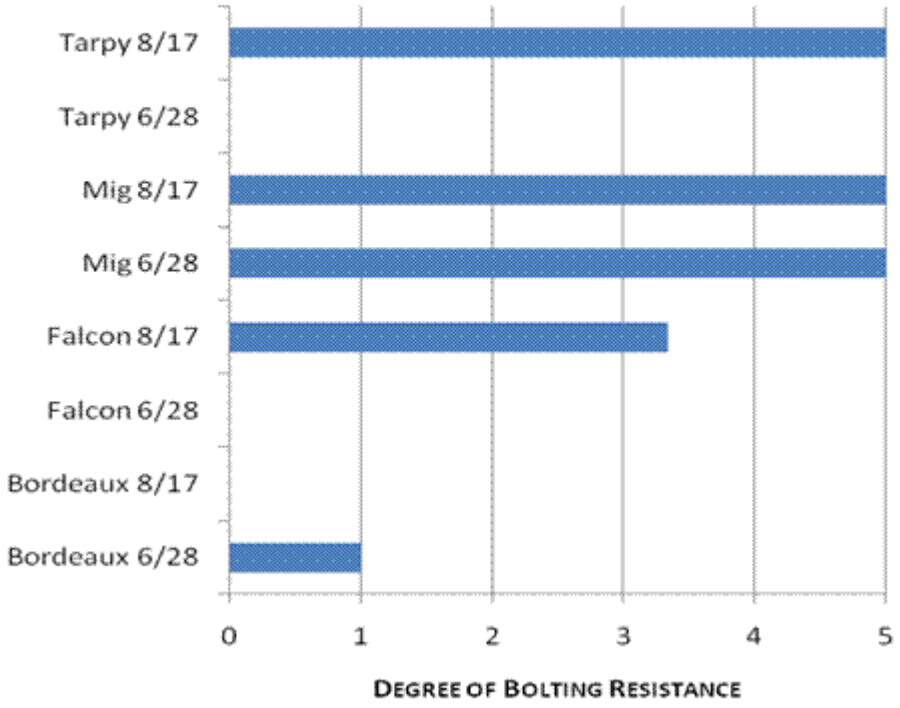


FIGURE 4
RESISTANCE TO BOLTING OF SAYOY SPINACH ON TWO HARVEST DATES

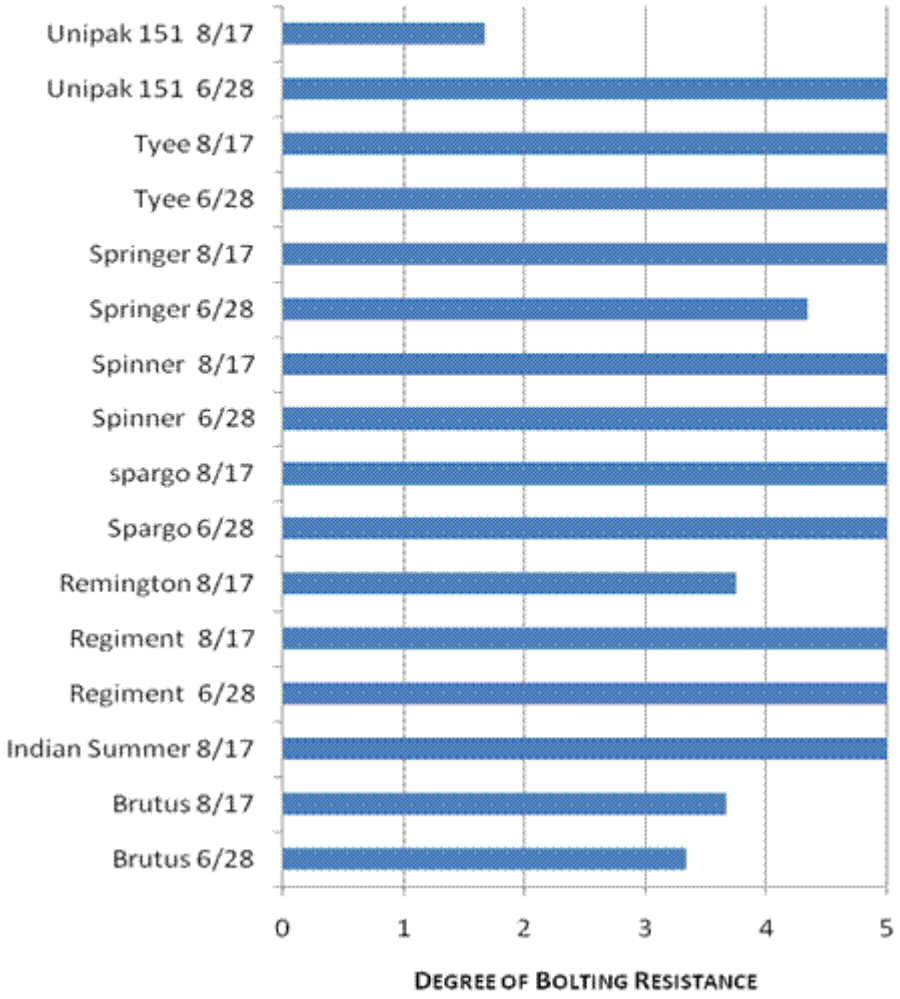


FIGURE 5
RESISTANCE TO BOLTING OF SEMI-SAVOY SPINACH ON TWO HARVEST DATES

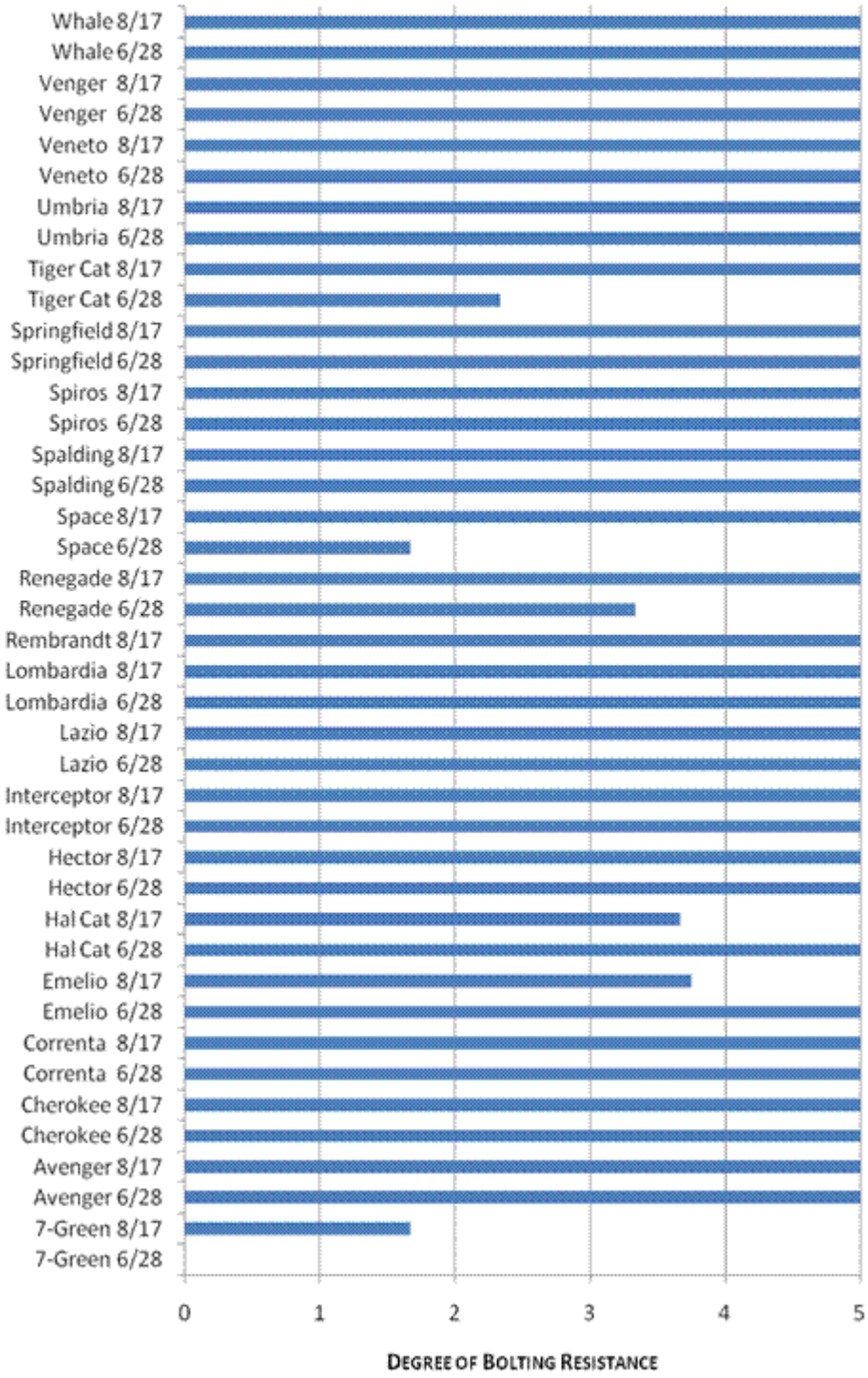


Photo	Variety

	*7-Green*
	*Avenger*

	*Bordeaux*
	*Brutus*

	*Cherokee*
	*Correnta*

	*Emelio*
	*Falcon*

	*Hal Cat*
	*Hector*

	*Interceptor*
	*Lazio*

	*Lombardia*
	*Mig*

	*Regiment*
	*Renegade*

	*Space*
	*Spalding*

	*Spargo*
	*Spinner*

	*Spiros*
	*Springer*

	*Tarpy*
	*Tiger Cat*

	*Tyee*
	*Umbria*

	*Unipak*
	*Veneto*

	*Venger*
	*Whale*