

# A Recessive Tendrilless Mutant in Ornamental Pumpkin

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## Introduction

Tendrils are borne at leaf nodes and are a common morphological feature of most cucurbits. Reports of tendrilless mutants are rare in the cucurbit family. In a perusal of recent gene lists for the major cucurbits two tendrilless mutants were reported, one in cucumber (4) and the other in watermelon (3). In spring of 2010 we discovered several breeding lines of ornamental pumpkin derived from the same breeding population that were either segregating for a tendrilless trait or were homozygous for the trait. Here we report on the inheritance of this tendrilless trait.

## Materials and Methods

Plant material used for all experiments consisted of ornamental pumpkin breeding lines developed at University of New Hampshire, and populations generated from these lines. During the summer months, June through October 1, pumpkins were grown at the Kingman Research Farm in Madbury, NH, USA. Seeds were sown on raised beds mulched with black polyethylene, and supplied with drip irrigation. Standard fertility and pesticide practices were used according to New England Vegetable Management Guide (2). In the greenhouse during the months of January through May, plants were grown in 8.7 L plastic nursery pots in a soil-less mix (Pro-mix, Griffin Greenhouse Supply, Tewksbury, MA, US). Plants were grown under natural daylight with 24 °C day (16 h) and 18 °C night (8 h) temperatures.

## Results and Discussion

The original tendrilless trait in our breeding program can be traced back to a bush breeding line, NH1182Bu, developed in the late 1990s. Another bush breeding line developed from NH1182 was crossed to a vine line with resistance to powdery mildew, and in an F<sub>2</sub> population derived from this cross, several lines were developed that were either homozygous or segregating for the tendrilless trait. In crosses of plants with tendrils (T) to plants which are tendrilless (t), F<sub>1</sub> plants had normal tendrils, regardless of the direction of the cross (Table 1). In a small backcross population of tendrilless x (tendrils x tendrilless) plants segregated 1:1 (15 T to 11t). Likewise,

a small segregating population derived from a plant identified as possibly heterozygous for the tendrilless trait, segregated 3:1 (19:7). In a larger F<sub>2</sub> population of bush plants derived from NH128-5Bu (T) x NH43-1472Bu (t), 61 plants had tendrils and 20 were tendrilless. In a second F<sub>2</sub> population derived from NH128-5Bu, (T) x 27-2-12-2V (t), 64 plants had tendrils and 16 were tendrilless. Both F<sub>2</sub> populations fit a Chi square ratio of 3:1 (tendrils: tendrilless). Thus, segregation data indicate that a single recessive gene confers tendrilless. I suggest that the tendrilless mutant be designated as *td*, following the cucumber nomenclature (1). In addition, the results indicate that expression of tendrils occurred with equal frequency on bush and vine plants. The dihybrid ratio of (NH128-5Bu x 43-147V)⊗ was 55 bush/tendrils:12 bush/tendrilless:9 vine/tendrils: 4 vine/tendrilless, with a  $\chi^2$  probability of 0.15 for an expected 9:3:3:1 ratio. The rather low probability can probably be attributed to a deficiency (13) of vine segregants. Tendril shoots on bush plants in the field were shorter than those on vine plants, agreeing with results in a greenhouse study (see accompanying article in CGC). Most bush and vine lines in our acorn breeding germplasm are tendrilless, and we are in the process of determining if those plants share the same tendrilless allele with our ornamental pumpkin lines.

## Acknowledgements

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## Literature Cited

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Table 1. Segregation of a tendrillless trait in backcross and F<sub>2</sub> populations of *Cucurbita pepo*.

	Tendrils	Tendrillless	Exp. Ratio	$\chi^2$	P
NH128-5Bu x 27-472V <sup>z</sup>	18	0	1:0		
NH43-1472Bu <sup>z</sup> x H02-126V	10	0	1:0		
NH6-11-12H, V <sup>z</sup>	19	7	3:1	0.05	0.82
NH27-4-7V <sup>z</sup> x NH6-11-12H,V <sup>z</sup>	15	11	1:1	0.61	0.43
(NH128-5Bu x NH43-1472Bu <sup>z</sup> ) <sup>⊗</sup>	61	20	3:1	0.004	0.95
(NH128-5Bu x 27-2-12-11V <sup>z</sup> ) <sup>⊗</sup>	64	16	3:1	1.07	0.30

<sup>z</sup>Indicates parents which are tendrillless or heterozygous (H) for tendrillless trait. Bu = bush and V = vine phenotypes.

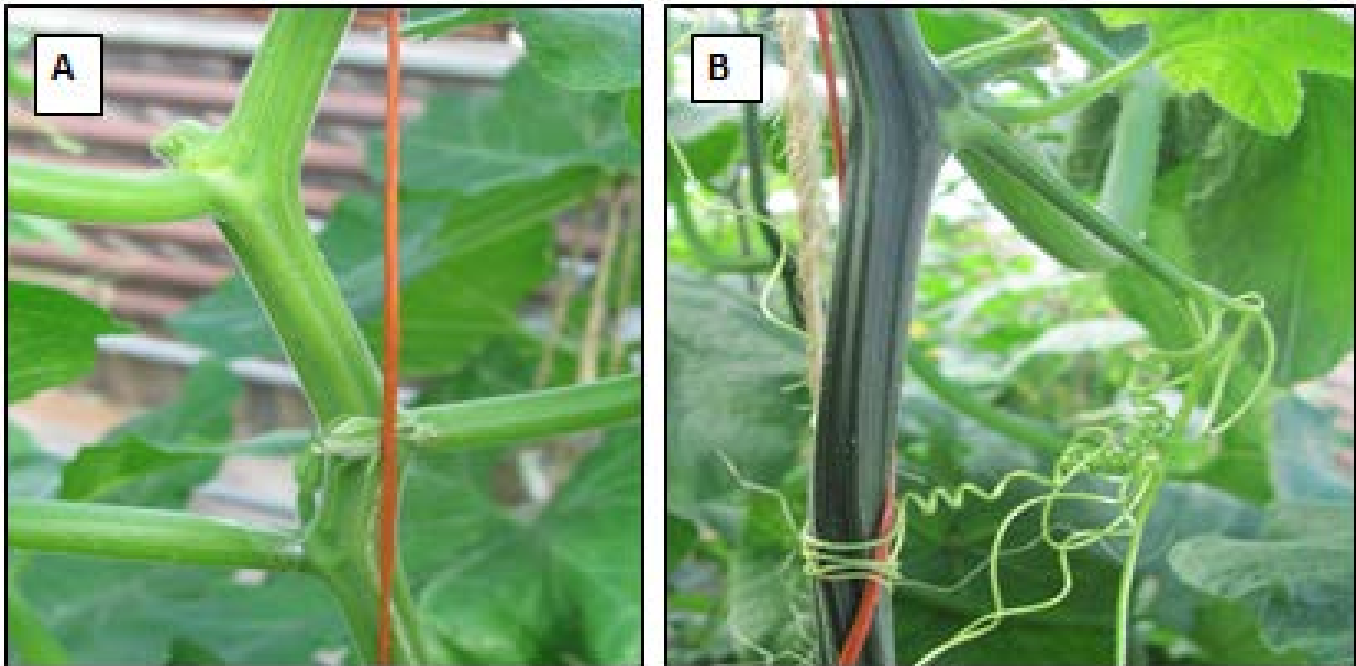


Figure 1. Example of tendrillless plant (NH6-11-12-1) (A) and a plant with compound branching tendrils (B) in *Cucurbita pepo*.