

Growth Patterns in Peonies

by

Dr. Patricia S. Holloway and Ms. Melissa K. Pietila
School of Natural Resources and Agricultural Sciences
Agricultural and Forestry Experiment Station

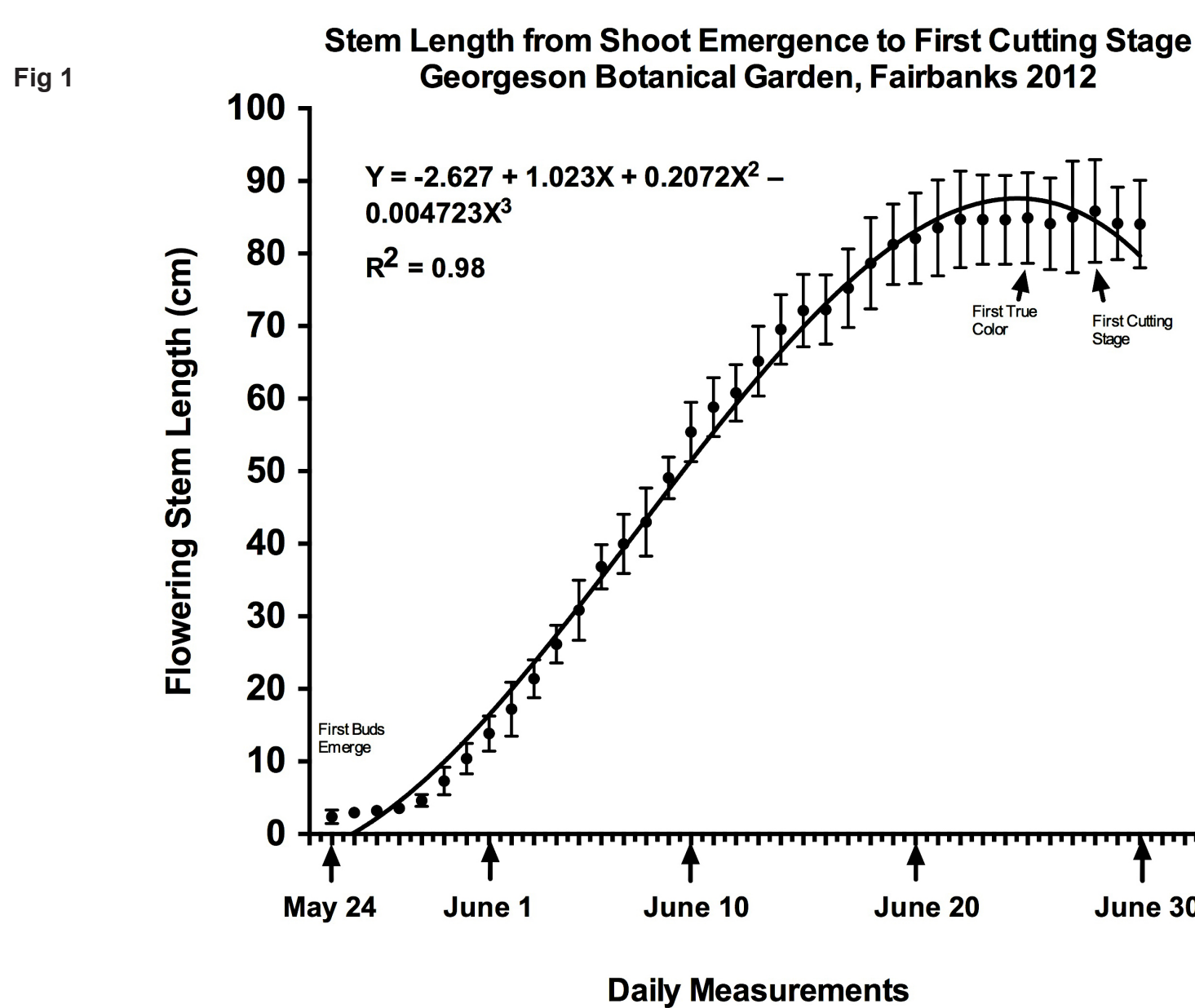


Introduction

Peonies are becoming an important horticultural industry in Alaska. In 2012, more than 25,000 fresh cut stems were sold to florists, consumers, at farmers markets, to flower brokers and wholesalers in other states, Canada and Taiwan. We are interested in documenting the growth patterns of peonies to understand the seasonal timing of events and the changes that occur as the peony stem grows, matures and reaches cutting stage. The objective of this project was to measure growth through the early season, and examine flower bud development as it progresses to cutting stage.

Flowering Shoot Growth

We collected daily measurements of shoot length from bud emergence in May through full bloom using five, 'Sarah Bernhardt' peonies growing in the Georgeson Botanical Garden, Fairbanks, Alaska. We also tabulated thaw degree-days at the same time to learn if there is a correlation between heat unit accumulation and growth. Data were analyzed with curvilinear regression for best fit and correlation.



What We Learned

1. In Fairbanks, there are three distinct phases in pre-flowering shoot growth of peonies:

Stage 1: Slow. About one week from initial bud emergence (May 24), lasting about 6 days; (to about June 2 in 2012) Average daily growth, 1.2 cm (0.5 inches).

Stage 2. Rapid. Lasting from Stage 1 until just before first color is visible (about June 25 in 2012) Average daily growth 3.6 cm (1.4 inches).

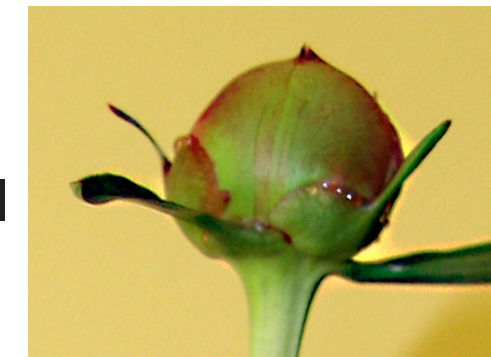
Stage 3. Flat. From first color to first cut (June 28 in 2012) Average daily growth: 0.2 cm (0.08 inches)

2. Daily growth is not directly correlated with daily air temperature heating degree-days. Other factors such as soil temperature and rainfall probably influence growth.

Bud Maturity Index

We were interested in learning how buds change as they mature. We used a well-known maturity index (below) and determined how buds change in fresh and dry weight and moisture content throughout these stages.

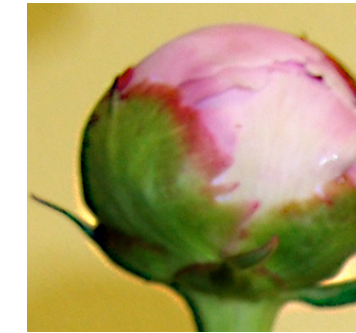
Stage 1 Hard, tight bud, green sepals nearly completely closed, little petal color, if any.



Stage 1.5 Hard tight bud, slight petal color.



Stage 2. Firm bud, petals showing true color between sepals.



Stage 2.5 Single petal "pops up" or separates at top, core hard.



Stage 3 Slightly soft bud, "Squeezable".



Stage 4 Very loose bud, hollow feel



Fig 2. Fresh Weight of Different Bud Stages 'Sarah Bernhardt' Peony (n=20)

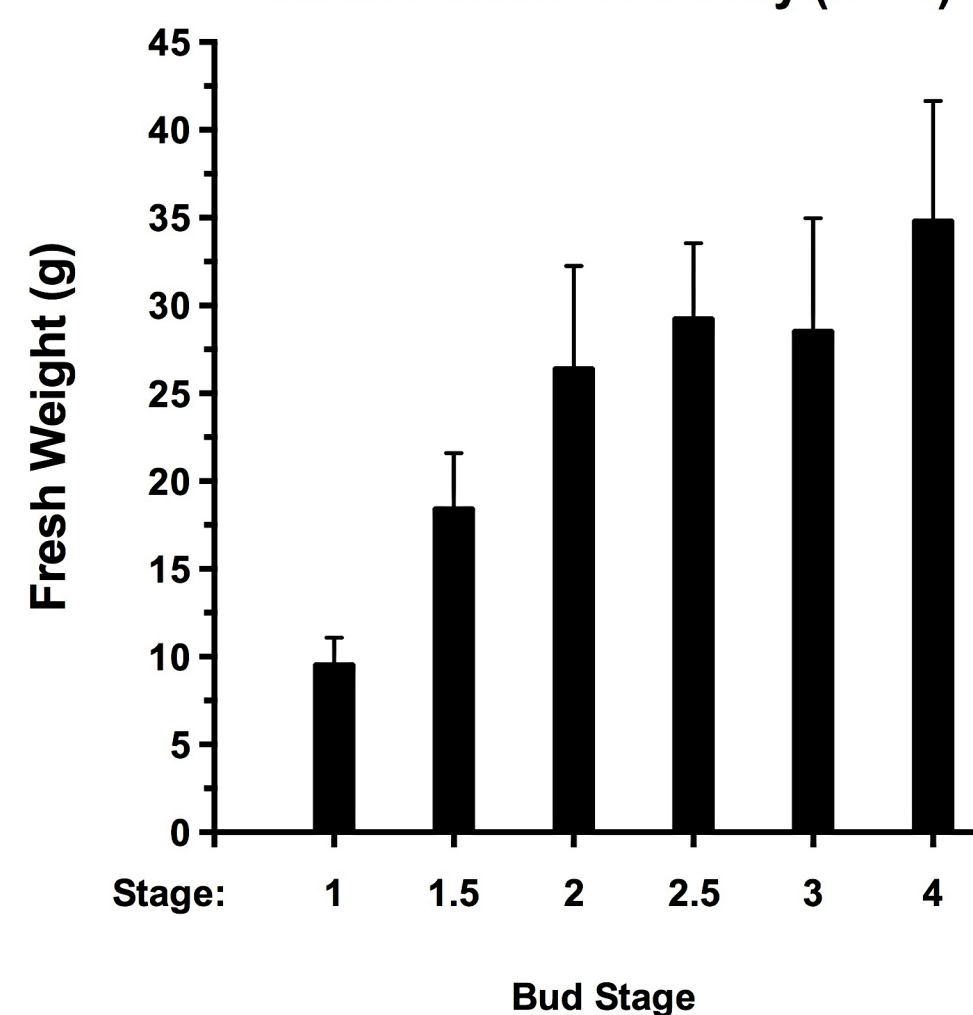


Fig 3. Dry Weight of Different Bud Stages 'Sarah Bernhardt' Peony (n=20)

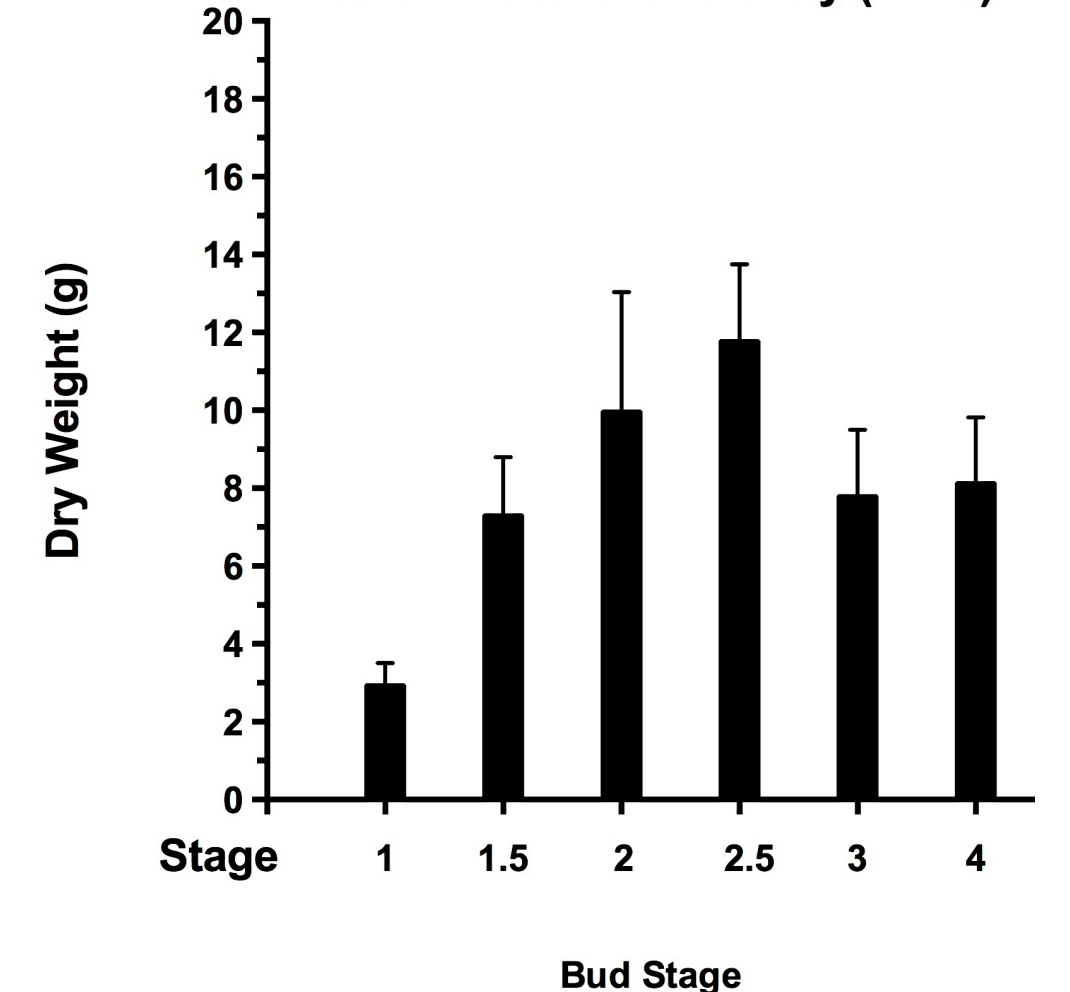
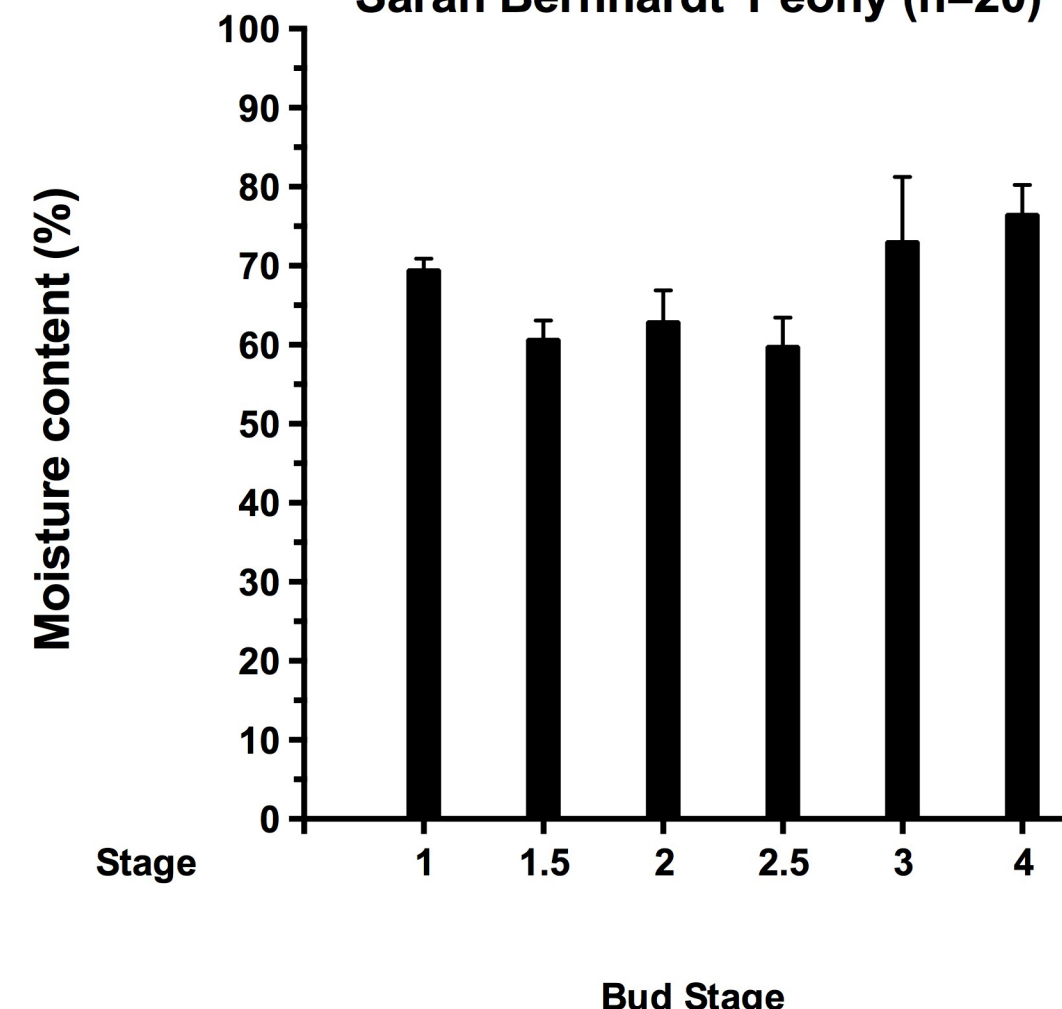


Fig 4. Moisture Content of Different Bud Stages 'Sarah Bernhardt' Peony (n=20)



What We Learned

1. **Fresh weight** increases from tight bud (stage 1) to loose bud (stage 4) stages (Fig 2).

2. **Dry weight** increases through the petal "pop-up" stage (stage 2.5), then declines as the bud softens (Fig 3).

3. **Moisture content** is variable across stages but shows a slight rise as the bud softens and matures (Fig 4).

4. It appears that flower buds lose dry matter after stage 2.5, but weight continues to climb. Gain is most likely due to water uptake. We need to repeat this entire study in at least 2 more years to verify these results.