Assessment of *Rosa* spp. Plant Architecture in the Field

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TEXAS A&M AGRILIFE RESEARCH

Introduction

- Plant Architecture is the result of growth and branching processes and depends on genetic and environment factors and their interaction.
- For ornamental plants, the overall shape of the plant is a major component of visual quality and economic value.
- Rose plant architecture is a crucial trait in rose breeding as it affects the ornamental value and flower intensity.

Objectives

The objective of this study is to evaluate the segregation and inheritance of plant architecture in selected populations. This is important as it will improve our ability to select the appropriate parents to obtain seedlings with the desired growth type.

Materials and Methods

Four diploid populations (Table 1) were created from the hybridization of the heat tolerant (J06-20-14-3, M4-4), moderate (Old Blush) and sensitive parents (Sweet Chariot, Red Fairy). Ten seedlings in each population were selected to be evaluated for plant architecture.

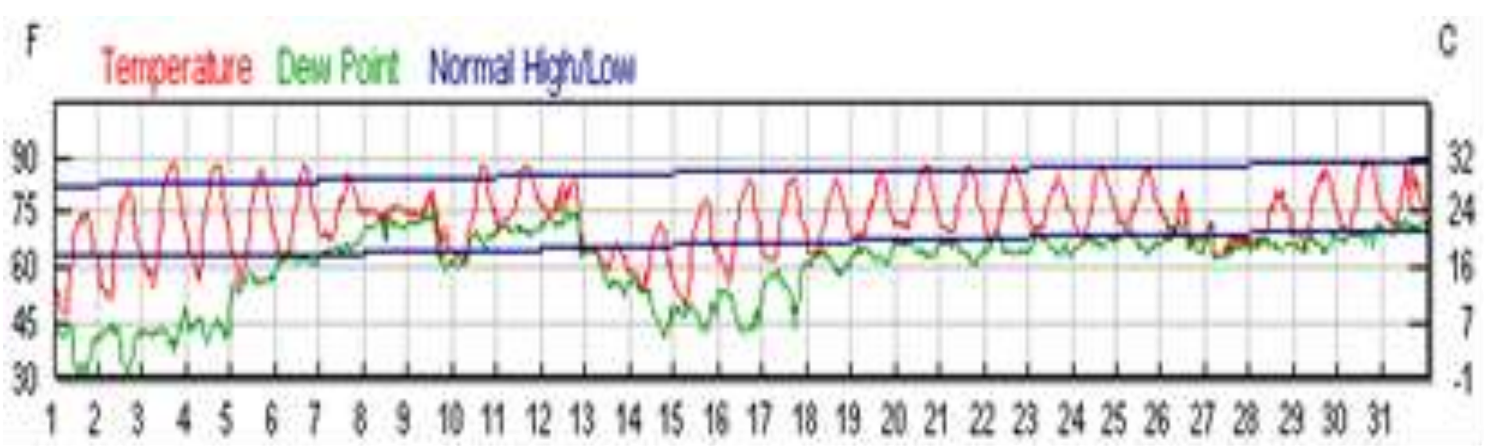
Table 1. Diploid rose populations evaluated.

FP	MP	Family	Cross Time	Greenhouse Exp
Old Blush	M4-4	10041	2010	Yes
Sweet Chariot	M4-4	10043	2010	Yes
J06-20-14-3	Vineyard Song	10073	2010	Yes
J06-20-14-3	Sweet Chariot	10074	2010	Yes

- **Environment**

The environment was in College Station, Texas raised bed in the field. Data were collected from May 1st, 2014 to May 9th.

Figure 1. Temperature of College Station, Texas in May 2014 (wunderground.com).



- **Measurements of the components of plant architecture:**

Plant Architecture is divided into the following components:

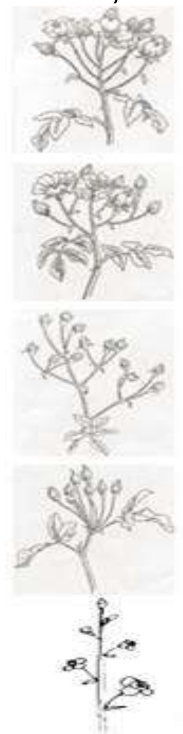
•Number of total nodes on the vegetative shoot (on primary and secondary branches) (Fig.3)

•Length of vegetative and reproductive shoots (on primary and secondary branches) (Fig. 4 and 7)

•Branching angles (between primary and secondary branch, secondary and tertiary branch) (Fig. 8)

•Inflorescence characteristics (number of flowers on terminal inflorescence and inflorescence structure type) (Fig. 2, 5 and 6)

Figure 2. Inflorescence types in Rosa flowers (The Genus Rosa, Ellen Willmott, 1914).



CORYMB, CORYMBOSE—A raceme with the peduncles becoming gradually shorter towards the top of the axis, so that all the flowers are about on a level.

CYME, CYMOSE—An inflorescence formed of a terminal flower beneath which are lateral branches, each having a terminal flower an lateral branches again similarly dividing, and so on.

PANICLE, PANICLED or PANICULATE—A central axis with peduncled flowers arranged along it, the peduncles being branched.

UMBEL,UMBELLATE—An inflorescence in which all the peduncles spring from the same point.

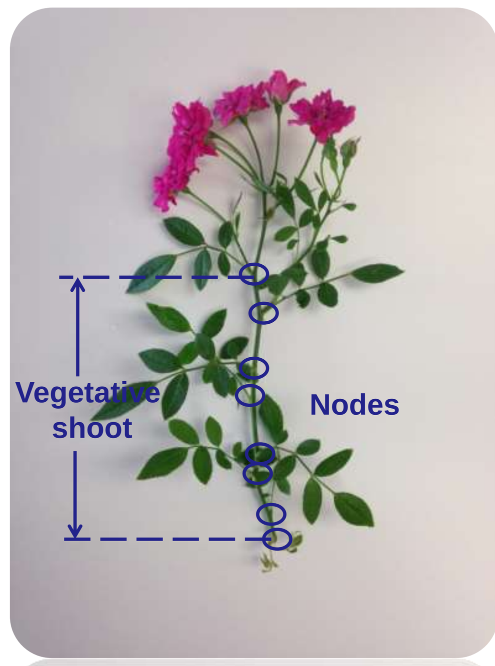
RACEME, RACEMOSE—An inflorescence consisting of an elongate central axis bearing equal or nearly unbranched side-stalks disposed throughout its length.

Results

Components of Vegetative Shoot

- **Number of Nodes on Vegetative Shoot**

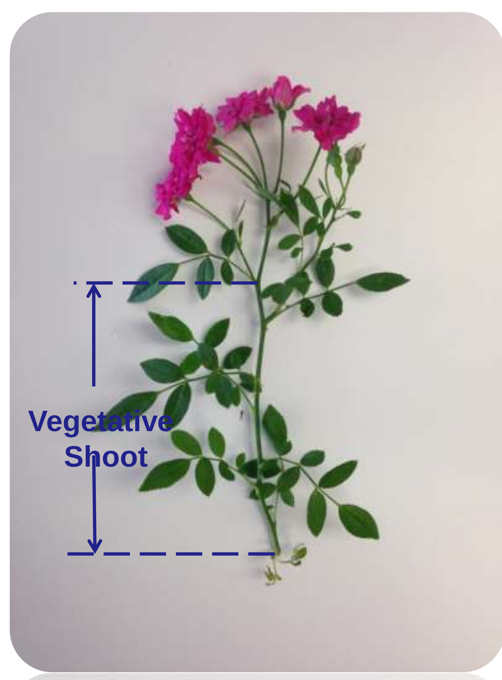
Figure 3. Number of nodes on the vegetative shoot of the four diploid rose populations as compared to their parents.



Popn# &Parents	Primary Branch	Secondary Branch
10041	8.4b	6.4b
10043	11.4b	10.0a
10073	17.7a	6.7b
10074	10.4b	8.0b
Significance	***	**
R^2	0.36	0.33
n	40	40
Old Blush	8	6
J06-20-14-3	9	5
Sweet Chariot	9	7
M4-4	8	5

- **Length of Vegetative Shoot**

Figure 4. Length of vegetative shoot of the four diploid rose populations as compared to their parents.



Popn# &Parents	Primary Branch	Secondary Branch
10041	22.5c	14.6
10043	34.1ab	20.6
10073	41.9a	17.0
10074	25.4bc	18.6
Significance	***	NS
R^2	0.36	0.14
n	40	40
Old Blush	26.8	15.8
J06-20-14-3	18.5	10.5
Sweet Chariot	20.5	13.5
M4-4	19.5	7.3

Components of Reproductive Shoot

Figure 5. Examples of common inflorescence structure.

- **Number of Flowers on the Terminal Inflorescence**

Figure 6. The number of flowers on the terminal inflorescence shoot of the four diploid rose populations as compared to their parents.

Popn# &Parents	Primary Branch	Secondary Branch
10041	9.2b	6.8c
10043	21.9a	12.2b
10073	25.5a	14.9ab
10074	23.2a	19.4a
Significance	***	***
R^2	0.39	0.41
n	40	39
Old Blush	5	5
J06-20-14-3	24	13
Sweet Chariot	37	12
M4-4	12	12

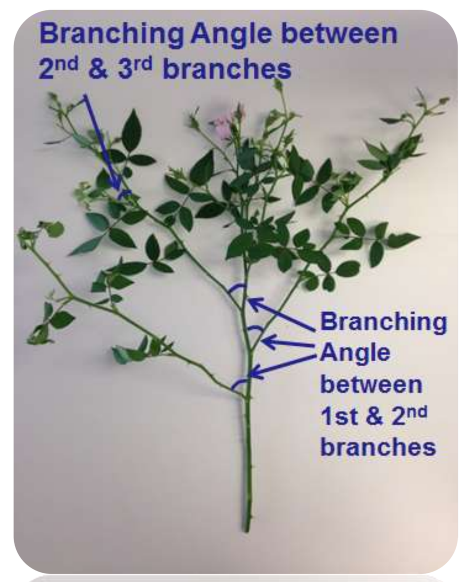
- **Length of Inflorescence**

Figure 7. Length of the inflorescence of the four diploid rose populations as compared to their parents (cm).

Popn# &Parents	Primary Branch	Secondary Branch
10041	6.6c	5.5b
10043	8.5ab	6.9ab
10073	8.4b	7.3a
10074	9.8a	7.2a
Significance	***	*
R^2	0.39	0.18
n	40	40
Old Blush	8.8	5.5
J06-20-14-3	8.0	5.5
Sweet Chariot	9.5	7.0
M4-4	9.0	4.5

Branching Angles

Figure 8. Branching angles of the four diploid rose populations as compared to their parents.



Popn# &Parents	Angle between 1st&2nd Branch	Angle between 2nd&3rd Branch
10041	54.5	52.5a
10043	61.5	42.5b
10073	56.0	58.0a
10074	50.5	59.0a
Significance	NS	**
R^2	0.10	0.33
n	40	40
Old Blush	40	65
J06-20-14-3	75	50
Sweet Chariot	55	35
M4-4	60	65

Conclusions

- All the components of plant architecture except the length of the secondary vegetative branch and the angle between primary and secondary branches showed differences among the populations indicating a genetic component for plant architecture.
- Old Blush has the fewest flowers and Sweet Chariot has the greatest number of flowers per inflorescence.
- Most seedlings/parents' inflorescences are panicles.
- The length of pedicel differs among seedlings/parents.
- Number of pedicels on the panicle varies from one to four.