THE EFFECT OF FLORAL DISPLAY SIZE ON POLLINATOR VISITATION

Introduction

Many species of plants produce an excess of flowers, i.e., many of the flowers will not mature seeds. Two hypotheses link floral display size to pollinator visitation. According to one hypothesis, large floral display is important when pollinators are rare. If pollinators are rare, a plant with a large floral display will attract more pollinators and subsequently mature a larger number of seeds than plants that produce small floral displays. Hence they achieve higher fitness through the female function (= seed production). Another hypothesis also predicts that plants with large floral displays will have higher fitness than plants with smaller floral displays but pollinator limitation is not the key. Instead, by attracting more pollinators plants with large floral displays will disseminate more pollen and so fertilize more ovules on other plants. Hence, they gain higher fitness through the male function (=pollination). Both hypotheses assume that display size is heritable, and pollinator behavior can drive selection for large display size.

Rubber Rabbitbrush (*Chrysothamnus nauseosus*) has a showy floral display consisting of many small heads arranged in large inflorescences. The flowers are pollinated by a variety of insects. Flower production exceeds seed production. For this exercise you will be addressing the question: Is size of floral display positively correlated with pollinator visitation?

METHODS

Working in small groups of 4-5 students, select a plant currently in flower and cut off several stems at ground level. Stems will be manipulated to create artificial plants of different sizes. Attach stems to a stake using wire provided so that when stuck in the ground the tops of all inflorescences are at the same height. Manipulate the number of

stems to achieve the following treatments (clearly label each treatment halfway down the stake with tape):

1 – 1 inflorescence	Label this small
2 – several stems such that the combined diameter of the inflorescences is ~ 10cm	Label this medium
3 – several stems such that the combined diameter of the inflorescences is > 30cm	Label this large

You should now have 3 plants that you can visually arrange in order of floral display size. Locate a site in the field and stick the inflorescence-bearing stakes in the ground so that the plants are arranged in a circle, with approximately 30-40 cm between adjacent inflorescences and at least 2m from the nearest plant in flower. **The order of the inflorescences should be random**. You now have one replication of the experiment. Each group will replicate the experiment and data will be pooled at the conclusion of the lab.

If pollinators are active nearby then you are ready to go. If not, wait until some are nearby but do not wait longer than 10 minutes. Divide up the group so that everyone has a role. During a 30 min block of time you will record:

1- the number of ***visits*** per plant
2- the number of ***rejections*** per plant
3- the type of insect

visit = insect lands on inflorescence
rejection = insect inspects but does not land

If an insect lands, then flies up within a short distance of the inflorescence and then relands on it, this is considered the same visit and is not recorded a second time. If an insect leaves to inspect another inflorescence then returns to the previous inflorescence, or if it flies up and heads away some distance before returning, this is considered a new visit.

After the field component of lab hand in the data sheets. Data will be compiled for you. In the Discussion section of your paper make sure to address/answer the following:

1) What do you conclude about floral display size and pollinator behavior? Does the data support the hypothesis tested?
2) Did floral size differentially affect pollinator groups (i.e. Did the results differ depending on the type of pollinator?)?
3) Indicate methodological problems that may have biased or confused the results.
4) Indicate how these problems could be resolved or the experiment improved.

Record your data in the table below. R = rejection, V = visit. Record each event by placing a letter in the appropriate column to indicate the type of insect: (**B**=bee, **W**=wasp, **L**=moth or butterfly, **I** = other insect).

Treatment small		**Treatment medium**		**Treatment large**	
R	**V**	**R**	**V**	**R**	**V**
B					
W					
I					
L					
sum					