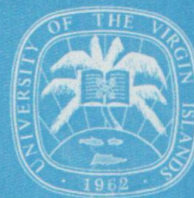


Factsheet:

# Determining the Sex of Papaya Plants for Successful Management of Backyard and Commercial Production

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UVI-AES Biotechnology & Agroforestry



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Papayas can produce three possible flower types: male (staminate), female (carpellate) and bisexual (hermaphrodite). More than one flower type can be present on a plant at a time. This can cause confusion in identifying the true sex of a papaya plant. The females and hermaphrodites are the fruit bearing flower types.

Male papaya plants are recognized by long floral stalks that grow out from the main stem (Fig. 1) and produce clusters of small trumpet-shaped flowers (Fig. 2). The flowers have five white to yellow colored petals that are fused together for 2/3 of their length to form the trumpet shape. Ten yellow/orange stamens, that produce pollen, are present where the petals fuse together to form a tube. Pollen from male plants can be used to pollinate female flowers to produce fruit. Male plants will, on rare occasions, produce a few elongated fruits that can be seen hanging from the long flower stalk (Fig. 3). Seeds from a male fruit will only produce male plants.



Figure 1 (top left). Male papaya plant.  
Figure 2 (bottom). Staminate flowers from male papaya plants produce pollen.  
Figure 3 (top right). Male papaya plant with fruit.



Figure 4 (top). Female flower buds at nodes.

Figure 5 (middle). Carpellate papaya flowers from female plants.

Figure 6a, b (Bottom). Papaya fruit shapes from female plants.



Female papaya plants have carpellate flowers that form at nodes where the leaf petiole and stem connect (Fig. 4). A small thumb sized immature green fruit with a light yellow multi-branched stigma can be seen in the center of opened flowers. The five white to yellow petals are not fused and open to form a bowl or cup shape surrounding the carpel or small immature fruit (Fig. 5). Female plants produce rounded to oval fruits (Fig. 6) but require pollen from another plant to set fruit. Pollen is brought to the female flower by wind and insects. Male plants are the most effective in pollinating female flowers. Bisexual trees, even when nearby, are not as efficient in pollinating female plants as the male plants.

Bisexual is the third type of papaya plant and is also referred to as a hermaphrodite. The bisexual flower contains both male (stamens) and female (carpellate) parts in the same flower. The long narrow flowers are also located at the node where the leaf petiole and stem are connected (Fig. 7). The five petals are white to light yellow and fused at the bottom third of the flower. The ten yellow to orange pollen producing stamens are located just above the point where the petals fuse together. The center of the flower has a pencil to small-finger sized green immature fruit (carpel) with a light yellow, multi-branched stigma (Fig. 8). Bisexual flowers are usually self-pollinating and produce elongated to pear-shaped fruits (Fig. 9). When a bisexual papaya plant is stressed due to lack of water, disease and/or insects only the male parts of the flower fully develop, while the female organs are aborted in early development (Fig. 10). Since there is no fruit production from the development of male flowers, some homeowners have reported success in stimulating bisexual flowers to





Figure 7 (top left). Bisexual flower buds.

Figure 8a, b (top center, right). Bisexual papaya flowers containing both female and male floral parts together in the flower.

Figure 9a, b (middle). Fruits on bisexual (hermaphrodite) papaya plants.

Figure 10 a, b (bottom). Male flowers being produced on a hermaphrodite plant.



form and produce fruit by cutting the top of the plant off. It is not economically feasible to apply this technique in commercial production. The nonproductive plants should be removed to allow water and nutrients to be available for the fruit bearing plants.

The sex of a papaya plant cannot be determined by looking at seeds or young seedlings. Papaya plants need to be 2-5 feet tall before flowers develop and the sex of the plant can be determined. Papaya varieties should be selected and planted that bear fruit early. Generally, male and female plants form flowers closer to the ground than hermaphrodite plants. The healthier the plant, the sooner the flower buds will develop. By lifting the leaves of young plants and checking for flower bud development, where the leaf is attached to the stem, one can determine a nonproductive male plant (Fig. 11) from a potential fruit producing hermaphrodite or female plant (Fig. 12).

Because of the three different sexes of papaya plants, the UVI-AES-Biotechnology & Agroforestry Program encourages the public to start three papaya plants in a hill



(Fig. 13) and, after determining the plants' sex, thinning down to only one strong fruit-bearing plant (Fig. 14). Male trees may be kept at a rate of 1 male plant to 5-8 female plants to ensure adequate pollination and fruit set on female plants. The male plant should be upwind of the female plant. Being able to identify the sex of papaya plants will ensure the maximum fruit production from the backyard or farming operations.

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Figure 11 (top left). Young male papaya plant.

Figure 12 (top right). Young female papaya plant.

Figure 13 (bottom left). Papaya planted three to a hill ready to be sexed and thinned.

Figure 14 (bottom right). Papayas thinned to one strong fruit-producing plant.

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