HS1081

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Performance of Selected Diploid Watermelon Pollenizers[1]

J.H. Freeman, G. A. Miller, S.M. Olson[2]

Summary

As seedless watermelons (Citrullus lanatus) increase in popularity, production is being shifted away from seeded watermelons. To achieve successful fruit set in triploid watermelons, a diploid watermelon cultivar must be planted as a pollen source. Multiple diploid cultivars were compared to determine their effectiveness as pollenizers. All pollenizer cultivars were planted within plots of triploid watermelon with buffers on all sides of the plots to contain pollen flow within individual plots. All pollenizer cultivars performed similarly and pollen flow was contained within experimental plots as indicated by minimal fruit set in check plots.

Over the last decade, the popularity of seedless watermelon [*Citrullus lanatus* (Thunb.) Matsum. and Nakai] has increased. During peak watermelon production in the U.S. in 2005 and 2006, seeded watermelons comprised only 22 to 23% of the market and averaged four to five cents less per pound than seedless (USDA, 2005-2006). When growers transfer acreage to seedless watermelon production, they must take into account that triploid watermelon plants do not produce enough viable pollen to pollinate themselves (Maynard, 1992; Maynard and Elmstrom, 1992). Diploid cultivars can provide the pollen for the triploid cultivar. To achieve optimal yields, 20% to 33% of the plants in the field should be diploid (Fiacchino and Walters, 2003; NeSmith and Duval, 2001). Traditionally, dedicated rows have been set aside for diploid cultivars (Figure 1). A wide range of pollenizer cultivars (Table 1) have now been designed to be planted in-row (Figure 2) with triploid plants. Eliminating dedicated row space in the field for pollenizers should increase the number of triploid plants and watermelons harvested per acre.

These pollenizer cultivars are relatively new, and the concept itself is new, thus, until our research, little work has been done comparing the attributes of these cultivars in this specific role. There are three basic types of pollenizer cultivars available: thin vine, bush type, and standard. The most important characteristics of these special pollenizers are: 1) proliferation of male flowers and pollen, 2) non-competitive growth habit, 3) and distinct fruit size or rind pattern. It is important that the cultivars

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2. J.H. Freeman, graduate student, Horticultural Science Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville; G. Miller, Area Vegetable Extension Specialist, Clemson University, Edisto Research and Education Center, Blackville, SC; and S.M. Olson, Professor, North Florida Research and Education Center - Quincy, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

have high numbers of male flowers throughout the season in order to provide adequate pollen for fruit set in the triploid crop. It is important that the pollenizer growth habit does not compete with the triploids because at a 1:3 pollenizer to triploid ratio, the pollenizers competition will impact two thirds of the triploid plants. It has been shown that intra-specific competition can shift the size distribution and amount of fruit produced by the plant (Cushman et al., 2004; Motsenbocker and Arancibia, 2002; Sanders et al., 1999). Other important characteristics of the pollenizer cultivar are the size and rind pattern of the fruit, which enable a harvesting crew to distinguish marketable fruit from pollenizer fruit.

In the spring of 2005 and 2006, research was conducted by the University of Florida and Clemson University to compare the effectiveness of new pollenizer cultivars. Each cultivar was inter-planted within a plot of Supercrisp triploid watermelon. The pollenizer cultivars were planted between the triploid plants, but there was no extra space added for pollenizers. The spacing between pollenizers and triploid plants was twenty inches. All pollenizers were planted at a 1:3 pollenizer to triploid ratio except Companion, which was planted at the recommended 1:2 pollenizer to triploid ratio. A buffer was planted around each plot to contain pollen flow within the plot. The buffer ensured that each pollenizer could be judged on its ability to provide pollen to the triploid plants it was planted with, without interfering with neighboring plots. In 2005, three cultivars of pollenizers (Jenny, Mickylee, SP-1) were used, and in 2006, seven cultivars (Companion, Jenny, Mickylee, Patron, Pinnacle, Sidekick, SP-1) were used. Each experiment incorporated a plot that contained no pollenizers. In these plots, the triploid cultivar Tri-X Palomar was planted in place of the pollenizer to ensure that all plant populations remained similar, as did intra-specific competition. This was to serve as a check to show if there was pollen contamination from neighboring plots. At all locations and all years, plants were grown on raised beds covered with black polyethylene mulch. In all locations rows were spaced eight feet apart, and plants within rows were spaced three feet apart. Seedless watermelon yield and soluble solids data were taken at all locations in both years, and hollow heart measurements were taken at all locations in 2006.

Results and Discussion

Location had a significant effect on yield, but there were no significant interactions between cultivar and location, so all locations were combined (Table 5). All plots containing pollenizers had significantly greater yield than the check at all locations in both years. There were no significant differences in yield between pollenizer cultivars during 2005. Complete yield data can be seen in Tables 2 and 3. Significant differences in seedless watermelon yield were observed between pollenizer cultivars during 2006. Plots pollenized by Sidekick yielded the greatest at 58,252 lbs/acre but were not significantly different than plots pollenized by Patron, SP-1, Jenny, or Mickylee which yielded 56,854, 55,148, 55,135, and 53,213 lbs/acre, respectively (Table 3). Plots pollenized by Companion yielded the lowest, at 44,621 lbs/acre but were not significantly different from plots pollenized by Pinnacle or Mickylee, which yielded 47,618 and 53,213 lbs/acre, respectively. At all locations in both years, pollenizer cultivar had a significant effect on number of melons, and all plots containing pollenizer cultivars produced significantly more melons than the check plots. There were no significant differences in the number of seedless fruits produced between pollenizers during both years. In 2006, pollenizer cultivar did not have a significant effect on hollow heart at the Citra, Florida and Blackville, South Carolina locations. The incidences of hollow heart at these locations were low overall, and this may be why there was no effect by the pollenizer. Pollenizer cultivar did have a significant effect on hollow heart at Quincy, Florida, and all pollenizer cultivars had significantly lower hollow heart as compared to the check plots. No significant differences in hollow heart were observed between pollenizer cultivars. At all locations in both years, pollenizer cultivar did not have a significant effect on soluble solids.

This research shows that some pollenizer cultivars perform better than others. The only cultivar that showed questionable performance was Companion. Due to its growth and flowering habit, it may not produce enough flowers and pollen at the end of fruit set in the triploid crop. Companion becomes overgrown by triploid plants near the end of the season and may not have flowers that are readily detectable by pollinators. This illustrates that pollenizers must be able to continue growing and producing flowers even when they are in close association with triploid plants. Of the cultivars tested, it appears that any of the thin vine or standard type pollenizers (Jenny, Mickylee, Patron, Pinnacle, Sidekick, and SP-1) would be a good choice. Some of the tested pollenizers (Mickylee, Jenny, and Pinnacle) can be harvested and sold if the grower has a market for seeded watermelons. If growers have a strong market for seeded melons, the use of in-row pollenizers may not be warranted, and the previous system of dedicated pollenizer rows may still be used. The pollenizers costs vary greatly and must be taken into consideration. Of the pollenizers previously recommended, cultivar selection should be based on economic and marketing concerns.

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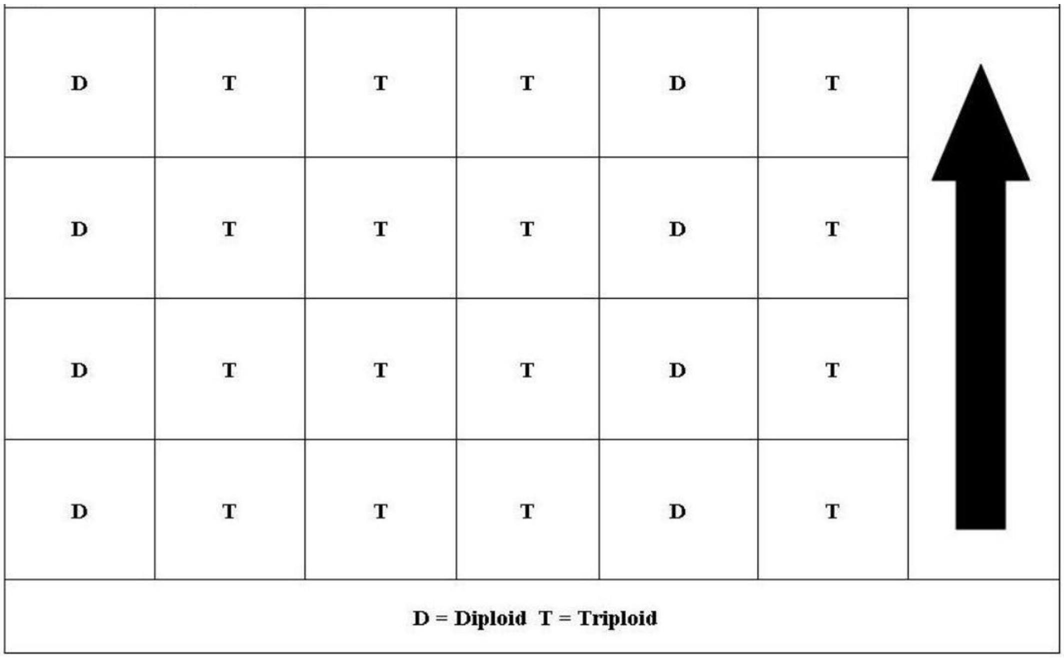

Figure 1. Traditional pollenizer arrangement

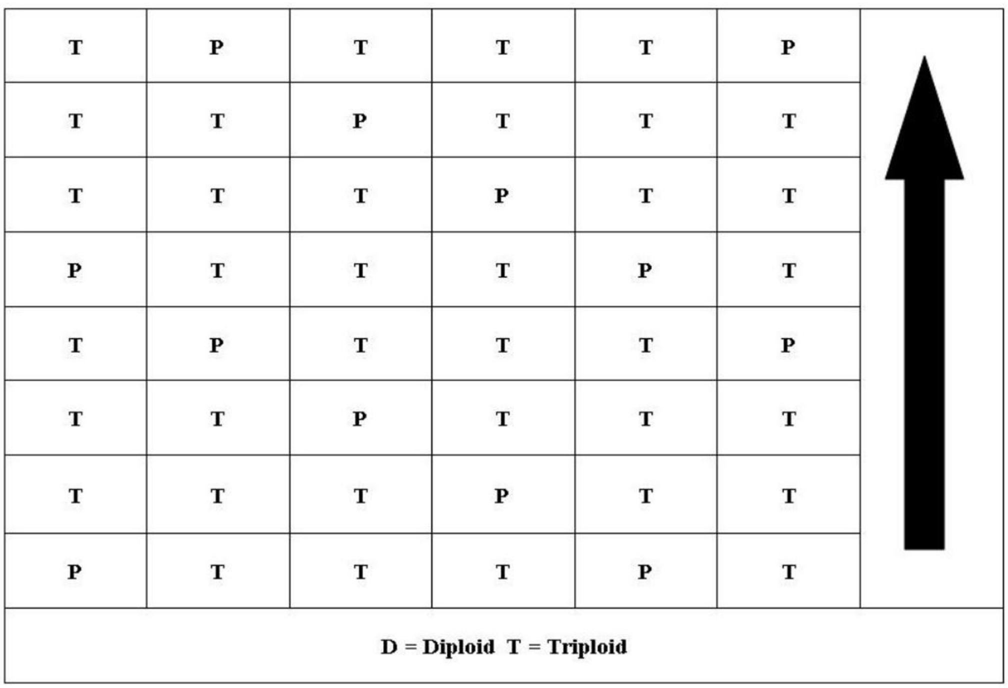

Figure 2. In-row pollenizer arrangement with 1:3 pollenizer to triploid ratio

Table 1. Commercially available diploid pollenizers

Cultivar	Source	Vine Type	Fruit Type
'Companion'	Seminis	Short internode, compact plant with medium foliage	Oblong gray
'Jenny'	Nunhems	Reduced vines, increased branching, thinner foliage	Round jubilee type stripe
'Mickylee'	Various – Abbott & Cobb, Willhite, etc.	Standard	Round gray
'Minipool'	Hazera	Slightly reduced standard type vines	Round gray
'Patron'	Zeraim Gedera	Reduced vines, increased branching, thinner foliage	Gray with thin green striping
'Pinnacle'	Southwestern Seed	Reduced vines, increased branching, thinner foliage	Jubilee type stripe
'Sidekick'	Harris Moran	Reduced vines, increased branching, thinner foliage	Crimson sweet with dark background, very small size
SP-1	Syngenta	Highly branched, thin vines with reduced leaves	Round gray with thin green striping

[Z] Pollenizer refers to the plant that provides the pollen. This term should not be confused with "pollinator" which refers to the insect vector (bees) that transports the pollen from the male flower to the female flower.
[Y] Sources are provided for information purposes and should not be considered endorsements. Similar cultivars may be found in other reputable sources.

Table 2. Seedless watermelon yield data from Blackville, SC. 2005

Pollenizer Cultivar	Total Weight (lbs/acre) [y]
Jenny	60326 a[y]
SP-1	57093 a
Mickylee	55141 a
Tri-X Palomar [z]	9369 b

[z] Triploid cultivar serving as check against pollen contamination from neighboring plots
[y] Means with the same letter are not significantly different at (*P* = 0.05) by Duncan's multiple range test.

Table 3. Seedless watermelon yield data from Citra, Fl; Quincy, Fl; and Blackville, SC. 2006

Pollenizer Cultivar	Total Weight (lbs/acre)
Sidekick	58252 a[z]
Patron	56854 a b
SP-1	55148 a b
Jenny	55135 a b
Mickylee	53213 a b c
Pinnacle	47618 b c
Companion	44621 c
Tri-X Palomar [z]	7629 d

[Z] LSD at $P = 0.05$
[Y] Triploid cultivar serving as check against pollen contamination from neighboring plots.

Table 4. Hollow heart measurements of seedless watermelons from Quincy, FL. 2006

Cultivar	Hollow heart Area ($inches^2$) [y]
Tri-X Palomar [z]	29.0 a
Patron	11.6 b
Jenny	10.8 b
Sidekick	10.5 b
Companion	9.0 b
Mickylee	8.4 b
SP-1	8.3 b
Pinnacle	5.8 b

[Z] Triploid cultivar serving as check against pollen contamination from neighboring plots.
[Y] Means followed by the same letter are not significantly different at (P = 0.05) by Duncan's multiple range test.

Table 5. P Values for factors affecting total seedless watermelon yield at all locations in 2006

Factor	P Value
Location	< 0.0001
Cultivar	< 0.0001
Location * Variety	.4280