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‘Ga. 03-6-72’ (Golding™), a Scab Resistant Pecan Cultivar with Excellent Kernel Quality for the Southeastern U.S.

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Abstract

‘Ga. 03-6-72’ is a new pecan (*Carya illinoinensis*) cultivar released by the University of Georgia (UGA) College of Agricultural and Environmental Sciences for use in commercial orchards in the southeastern United States. It produces large nuts (9.3 g) with consistently high kernel percentage (59.6%). Kernels shell easily into complete halves and have an attractive light golden color. Harvest occurs in early October in southern Georgia. Yields of ‘Ga. 03-6-72’ have been strong and comparable to established commercial cultivars such as ‘Sumner’, ‘Huffman’, and ‘Tom’. The cultivar also shows good resistance to pecan scab (*Venturia effusa*), exhibiting minimal disease in orchards managed with moderate fungicide programs and only moderate disease levels in unsprayed plantings. ‘Ga. 03-6-72’ is recommended for commercial trial in the southeastern U.S. in orchards where fungicide applications are part of standard management. As with all new UGA pecan releases, the UGA pecan breeding program recommends that growers limit initial plantings of any new cultivar until mature tree performance, including long-term scab resistance stability, has been confirmed under commercial orchard conditions.

Origin

In 2003 the cross 3-6 (‘Sioux’ × ‘Desirable’) was made by Patrick Conner at the University of Georgia (UGA) Tifton Campus. ‘Sioux’ is a 1962 USDA release which is notable for its light kernel color, excellent shelling ability, and vigorous growth (Conner and Thompson 2003; Madden 1974; McEachern 1998). ‘Sioux’ was selected from a cross between the cultivar ‘Schley’, which has notably thin shells, and the Texas native pecan ‘Carmichael’. ‘Sioux’ was at one time recommended for planting in Georgia (Goff 1999), but large plantings were not made because nut size is too small (6.2 g) to bring maximum prices (Conner and Thompson 2003). ‘Desirable’ was the most planted pecan cultivar in Georgia for several decades (Sparks 1997). Attractive traits of ‘Desirable’ are large nut size, consistent bearing, light kernel color, and excellent shelling ability into complete halves. Unfortunately, ‘Desirable’ has become extremely susceptible to pecan scab and is therefore no longer recommended for planting in southern Georgia where scab is more prevalent (Wells and Conner 2012). Cross 3-6 produced 205 nuts from which 124 seedlings were transplanted into a seedling orchard after growing the seedlings in pots for one year and removing those with symptoms of scab on the foliage. Seedlings were transplanted into the seedling orchard in 2005 on the UGA Tifton-Campus. ‘Ga. 03-6-72’ and first fruited in 2011 and was noted for its high kernel percentage (60%), excellent light kernel color, and lack of scab on the mother tree. ‘Ga. 03-6-72’ was selected in 2013 for replicated yield testing due to continued high nut quality.

Methods

Graftwood of ‘Ga. 03-6-72’ was given to a commercial nursery in the spring of 2013 where it was whip grafted onto 1-year-old seedling rootstocks along with several other advanced selections and check cultivars. The following spring these trees were dug and planted into replicated trials in a UGA research orchard in Tift Co. (lat. 31°30’34.74”N, long. 83°38’25.91”W) and in a commercial or-

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chard trial in Berrien Co. (lat. 31°5'36.34"N, long. 83°15'12.69"W) in southern Georgia. In the Tift Co. trial trees were planted in a randomized order in an orchard block with five trees per genotype and a spacing of 12.2 m × 12.2 m (67 trees·ha^{-1}). However, some trees were lost in the test due to hurricanes, leaving 3-5 trees per selection (Table 1). In this test 'Ga. 03-6-72' was planted along with the check cultivar 'Sumner' and newly released culitvars 'Tom' and 'Huffman'. Nitrogen was applied annually at 112 kg·ha^{-1}, while other nutrients and lime were applied according to leaf or soil analysis. Microsprinkler irrigation was used with one 75.7 liters·h^{-1} microsprinkler per tree. Fungicides and insecticides were applied following Georgia Extension Service recommendations (Wells et al. 2025) except that the number fungicide applications were reduced by skipping fungicide sprays from budbreak until fruit sizing period in June resulting in only 4-6 fungicide applications per year. Culture of the trees in the Berrien Co. trial were similar to the Tift Co. trial except that trees were spaced 7.6 m apart within the row and rows were 15.2 m apart and there were 3-4 replications per genotype (Table 2). In the Berrien test, 'Desirable' was the check cultivar and selections Ga. 99-1-246, Ga. 00-13-5, and Ga. 1-10-6 were included as additional trial selections from the breeding program.

A random 50 nut sample was taken from each tree annually to determine nut quality. Nuts were weighed and then shelled and percentage edible kernel was calculated by weight. Kernel samples were then rated for overall quality which is a combined visual measure of kernel fill, color, lack of packing tissue adherence, and ability to shell into complete halves. Samples were rated in a five-point quality scale where 1 = terrible, 2 = poor, 3 = mediocre, 4 = good, and 5 = excellent. Nuts were harvested when >90% could be shaken from the tree with a mechanical shaker. Phenology data was recorded only for the trees located at Tift Co. Trees were monitored in the spring for bud break by evaluating twice weekly for the presence of extended individual leaflets in the exterior lower canopy, the presence of which were used to indicate bud break. Dichogamy type and flowering period were determined by observing trees twice weekly in April and May. Pollen shed period was evaluated by tapping catkins and looking for the presence of shedding pollen. Stigma receptivity beginning was indicated by swollen stigmatic papillae (Wetzstein and Sparks 1989) giving the stigma a waxy look. The end of receptivity was determined by the presence of dry, brown-colored stigmas. The number of nuts per cluster was determined by counting the number of nuts on five random clusters on each of the four sides of the tree in August and calculating the average. Beginning in mid-September, trees were monitored twice weekly for shuck split by recording the percentage of 20 nuts observed around the tree canopy with dehisced shuck sutures. Leaf scab, nut scab, black pecan aphid (*Melanocallis caryaefoliae*) damage and sooty mold presence on the leaves were evaluated in September of each year. Leaf scab was evaluated on a scale of 1 to 4 with the worst disease expression recorded, where 1 = no scab lesions, 2 = a few isolated lesions with restricted growth, 3 = multiple lesions with expanding growth, 4 = stem scab lesions or defoliation. Nut scab was evaluated on a 1 to 5 scale with the average and worst disease expression recorded where 1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions with 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Black pecan aphid damage was rated on a four-point scale observing the lower interior canopy: 1 = no damage, 2 = light chlorotic spotting, 0% to 25% leaves affected, 3 = moderate chlorotic spotting, 26% to 75% leaves affected, 4 = heavy chlorotic spotting, 76% to 100% leaves affected. The presence of sooty mold on the leaves was rated on a four-point scale where 1 = no accumulation, 2 = light accumulation, 3 = moderate accumulation, 4 = heavy accumulation.

In addition to the two yield trials, a minimally sprayed scab resistance trial of multiple cultivars is maintained at a nearby orchard on the Tift Co. farm. This orchard gets similar care to the yield trials except that only two sprays are applied in August to control hickory shuckworm (*Cydia caryana*) and pecan scab is left untreated. One to three trees of various cultivars and selections are grafted in a single block randomized design into this trial to observe scab infection levels on untreated trees

in a high disease pressure situation using the methods described above. Nut yield and quality data is not obtained from this orchard.

Yield data for each year of growth were calculated for each clone by averaging all the replicate trees for that clone for the given year. Quality and pest resistance characteristics in the yield trials were calculated by averaging all years of data together. Yield, phenology, nuts per cluster, nut size and percent kernel differences between cultivars were determined using one-way analysis of variance (ANOVA) with mean separation by Holm-Sidak multiple range test ($P<0.05$). Pest resistance ratings and overall nut quality categorical scores were analyzed by a nonparametric Kruskal-Wallis test and if it was rejected then a Dunn's test was used for multiple comparisons. Pest resistance ratings in the scab resistance trial were evaluated in 2017 to 2024 and years were treated as replications for each cultivar. Statistical analysis was performed using SigmaPlot 12.3 statistical software (Systat Software, San Jose, CA).

Description and Performance

Yields of 'Ga. 03-6-72' in the Tift Co. trial were good and very similar to the check cultivar 'Sumner', a commonly planted cultivar in Georgia orchards (Fig. 1). Yields were higher in two years than the UGA releases 'Huffman' and 'Tom'. Yields were not significantly different when averaged over all years, but all three check cultivars are recommended ('Sumner') or recommended for trial ('Huffman' and 'Tom') in Georgia orchards, indicating yield of 'Ga. 3-6-72' is similarly acceptable. Yields in the Berrien Co. trial were good, and average yields were higher than the check cultivar 'Desirable' and three other trialed selections (Fig. 2). However, 'Desirable' often had severe yield reduction due to scab infection in this trial, and in year 9 (2022) the crop was lost to scab. This trial ended in year 9 because the planting was destroyed by Hurricane Idalia in the following year. The yields of 'Ga. 03-6-72' in this trial were similar to those reported for 'Ga. 03-6-32' (Kalos®) and 'Ga. 00-7-75' (Avalon®) which were trialed in a neighboring planting in the same orchard two years earlier (Conner 2022). In that trial 'Ga. 03-6-32' and 'Ga. 007-7-5' averaged 20.8 and 28.0 kg·tree^{-1}, respectively, in years 6-9. In the current trial, 'Ga. 03-6-72' averaged

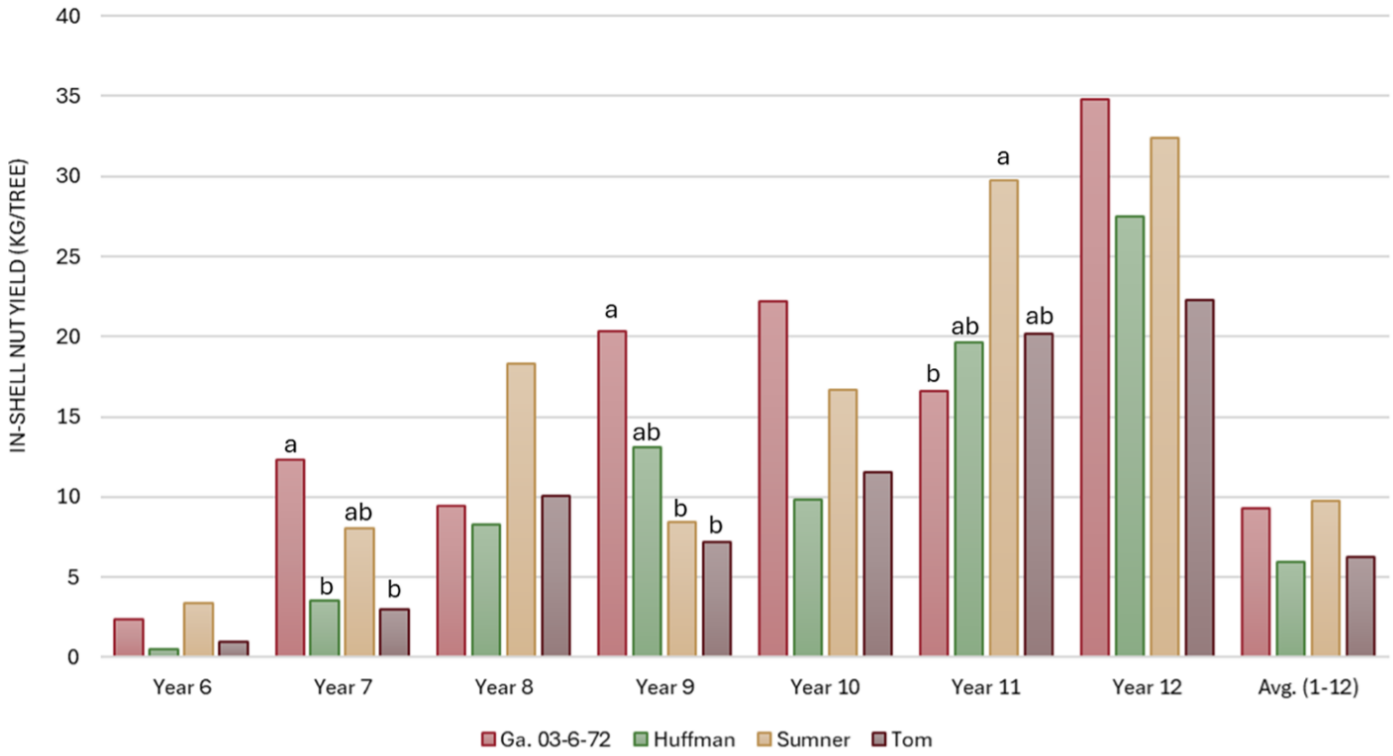

Figure 1. Average annual in-shell nut yield (kg per tree) of pecan cultivars in Tift Co., GA in the sixth through twelfth years of growth (2019-2025). Mean separation within a year of growth by the Holm-Sidak Test, P<0.05.

Table 1. Tree and nut and kernel quality attributes of pecan genotypes in a sprayed orchard in Tift Co., GA in the fifth through twelfth year of growth (2018-2025).

Cultivar	Trees (no.)	Nuts per cluster (no.)	Nut weight (g)	Kernel (%)	Quality (1-5)[z]	Avg. d of bud burst[y]	Leaf scab (1-4 scale)[x]	Avg. nut scab (1-5 scale)[w]	Max. nut scab (1-5 scale)[v]
Ga. 03-6-72[x]	5	2.4 b	9.1 c	60.1 a	4.9 a	2-Apr b	1.0	1.0	1.2 b
Huffman	4	2.3 bc	11.6 a	54.8 b	4.8 ab	29-Mar c	1.4	1.2	1.8 ab
Sumner	3	2.1 c	9.7 b	53.7 bc	4.4 b	6-Apr a	1.3	1.1	2.2 ab
Tom	4	2.8 a	7.1 d	52.6 c	4.3 b	2-Apr b	1.3	1.6	3.1 a
Sig.		<0.001[u]	<0.001[u]	<0.001[u]	<0.001[t]	<0.001[u]	NS	NS	<0.001[t]

[z]1 = Terrible; 2 = Poor; 3 = Mediocre; 4 = Good; 5 = Excellent.
[y]Bud burst is defined as the stage of growth when individual leaflets separate from the expanding bud.
[x]1 = no scab lesions, 2 = a few isolated lesions with restricted growth, 3 = multiple lesions with expanding growth, 4 = stem scab lesions or defoliation.
[w]1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions, 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Average damage seen on nuts over the tree.
[v]1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions, 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Maximum damage seen on any nut.
[u]Mean separation within a column by Holm-Sidak multiple range test, $P \leq 0.05$.
[t]Mean separation within a column by Kruskal-Wallis with Dunn's test, $P \leq 0.05$.

Table 2. Average nut size and kernel quality and scab resistance of pecan cultivars in a sprayed orchard in Berrien Co., GA in the fifth through ninth year of growth (2018-2022).

Cultivar	Trees (no.)	Nut weight (g)	Kernel (%)	Leaf scab (1-4 scale)[z]	Avg. nut scab (1-5 scale)[y]	Max. nut scab (1-5 scale)[x]
Ga. 03-6-72	4	9.3 a	59.7 a	1.0 b	1.0 b	1.0 b
Desirable	3	7.3 b	52.0 d	3.2 a	4.6 a	5.0 a
Ga. 99-246	4	9.5 a	51.6 d	1.0 b	1.0 b	1.0 b
Ga. 1-10-6	4	9.5 a	58.0 b	1.0 b	1.0 b	1.0 b
Ga. 00-13-5	4	8.8 a	53.8 c	1.0 b	1.0 b	1.0 b
Sig.		<0.001[w]	<0.001[w]	<0.001[v]	<0.001[v]	<0.001[v]

[z]1 = no scab lesions, 2 = a few isolated lesions with restricted growth, 3 = multiple lesions with expanding growth, 4 = stem scab lesions or defoliation.
[y]1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions, 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Average damage seen on nuts over the tree.
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[w]Mean separation within a column by Holm-Sidak multiple range test, $P \leq 0.05$
[v]Mean separation within a column by Kruskal-Wallis with Dunn's test, $P \leq 0.05$.

26.4 kg·tree^{-1} in years 6-9, indicating that yields of 'Ga. 003-6-72' are similar to other recently released pecan cultivars in early years of growth.

'Ga. 03-6-72' produces a moderately large (~9.2 g) nut with very high percentage kernel (~60%) (Tables 1, 2). Nut size and percent kernel were very consistent over years and among trees (Figs. 3, 4). Nut size ranged from 7.7 to 10.5 g in the Tift Co. trial and from 8.3 to 10.4 g in the Berrien Co. trial. Percent kernel ranged from 53.0% to 61.3% but was only lower than 58% in two samples in the Tift Co. trial and one sample in the Berrien Co. trial indicating consistently excellent kernel development. High percentage kernel of Ga. 03-6-72 is due to a thin shell combined with thick cotyledons (Fig. 5). Although the shell was thin, we did not experience any problems with shell breakage during harvest or postharvest handling. Ga. 03-6-72 was larger than 'Tom' and 'Desirable' but was only larger than 'Desirable' due to the size loss experienced by 'Desirable' from heavy scab infections as a good quality 'Desirable' nut will normally weigh about 9.5 g (Wells and Conner 2012). 'Ga. 03-6-72' was smaller than 'Huffman' and 'Sumner' but is still falls in the new USDA classification of 'Jumbo' (> 8.2 g), which is the largest category recognized. The nut shells easily to produce intact kernel halves. Kernel color is light golden with no veining or spotting (Figs. 5, 6). Overall kernel quality score was 4.9 which was superior to 'Tom' and 'Sumner' and similar to 'Huffman'.

'Ga. 03-6-72' has good resistance to pecan scab with little infection seen in the sprayed orchards at Tift Co. (Table 1) and none in Berrien Co. (Table 2). It should be noted that while these trials were sprayed with 4-6 fungicide sprays annually, that is about one half the number of sprays commonly applied to commercial pecan orchards in this region (Brock 2018). With this number of sprays the susceptible cultivar Desirable had very high levels

Table 3. Pest resistance of pecan cultivars in a minimally sprayed orchard in Tift Co., GA (2017-2025).

Cultivar	Trees (no.)	Leaf scab (1-4 scale)[z]	Avg. nut scab (1-5 scale)[y]	Max. nut scab (1-5 scale)[x]	Black pecan aphid damage (1-4 scale)[w]	Sooty mold (1-4 scale)[v]
Ga. 03-6-72	3	1.0 b	1.5 d	3.0 bc	1.4 c	1.2 ab
Ga. 00-7-75	2	1.0 b	1.0 d	1.1 c	2.1 abc	1.7 ab
Ga. 03-6-32	2	1.3 b	2.8 bcd	4.0 ab	1.4 c	1.4 ab
Desirable	1	3.9 a	5.0 a	5.0 a	2.2 abc	2.3 ab
Elliott	1	1.0 b	1.0 d	1.0 c	1.6 abc	1.5 ab
Huffman	2	1.3 b	2.0 d	3.5 abc	1.6 bc	1.0 b
Pawnee	1	2.8 ab	4.7 ab	4.9 a	1.7 abc	1.2 ab
Sumner	2	1.3 b	2.5 c	4.1 ab	1.9 abc	1.6 ab
Stuart	1	1.4 b	4.3 abc	5.0 a	3.3 a	2.9 a
Zinner	1	1.8 b	4.3 abc	5.0 a	2.4 ab	1.9 ab
Sig.[u]		<0.001	<0.001	<0.001	<0.001	<0.001

[z]1 = no scab lesions, 2 = a few isolated lesions with restricted growth, 3 = multiple lesions with expanding growth, 4 = stem scab lesions or defoliation.

[y]1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions, 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Average damage seen on nuts over the tree.

[x]1 = no scab lesions, 2 = a few lesions with restricted growth, 3 = multiple lesions, 0% to 10% coverage, 4 = 11% to 50% coverage, 5 = 51% to 100% coverage or nut drop. Maximum damage seen on any nut.

[w]1 = no damage, 2 = light chlorotic spotting, 0% to 25% leaves affected, 3 = moderate chlorotic spotting, 26% to 75% chlorotic spotting, 4 = heavy chlorotic spotting, 76% to 100% leaves affected.

[v]1=no accumulation, 2=light accumulation, 3=moderate accumulation, 4=heavy accumulation.

[u] Mean separation within a column by Kruskal-Wallis with Dunn's test, $P \leq 0.05$. Years were considered replications for analysis.

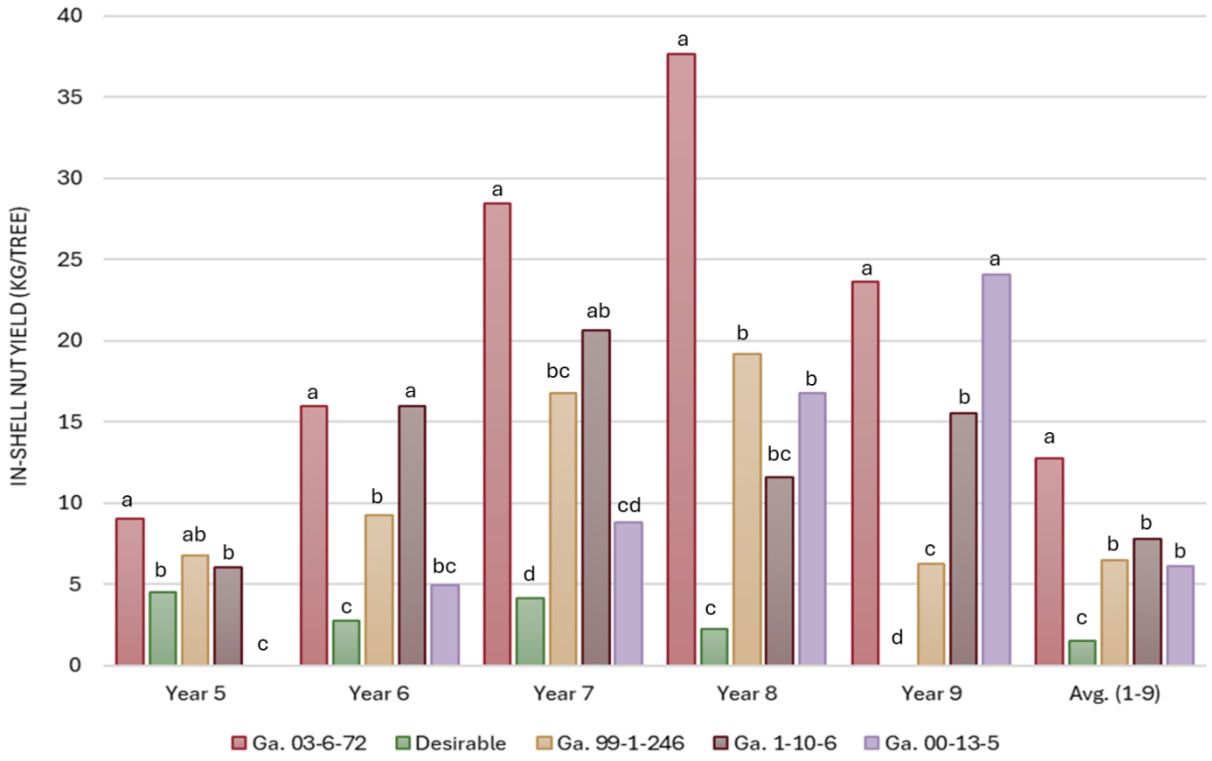

Figure 2. Average annual in-shell nut yield (kg per tree) of pecan genotypes in Berrien Co., GA in the fifth through ninth year of growth (2018-2022). Mean separation within a year of growth by the Holm-Sidak Test, $P<0.05$.

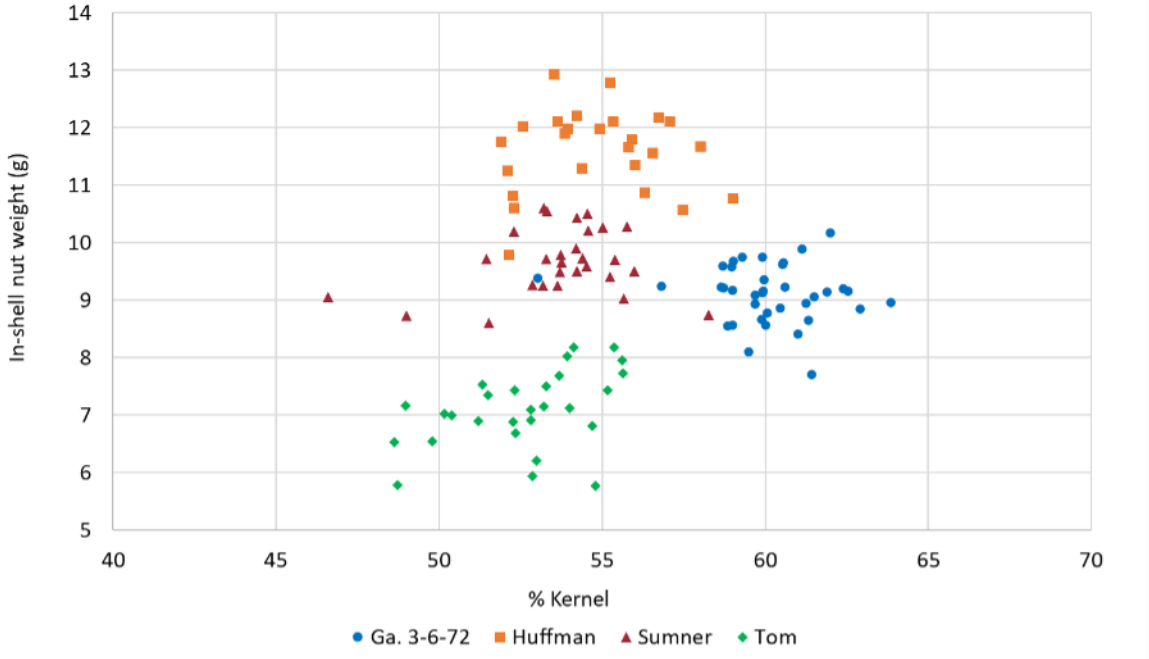

Figure 3. Nut size (g) and percent kernel of pecan genotypes in Tift Co., GA in the sixth through eleventh year of growth (2019-2024). Each point represents the nut quality of a single tree nut sample for a given year.

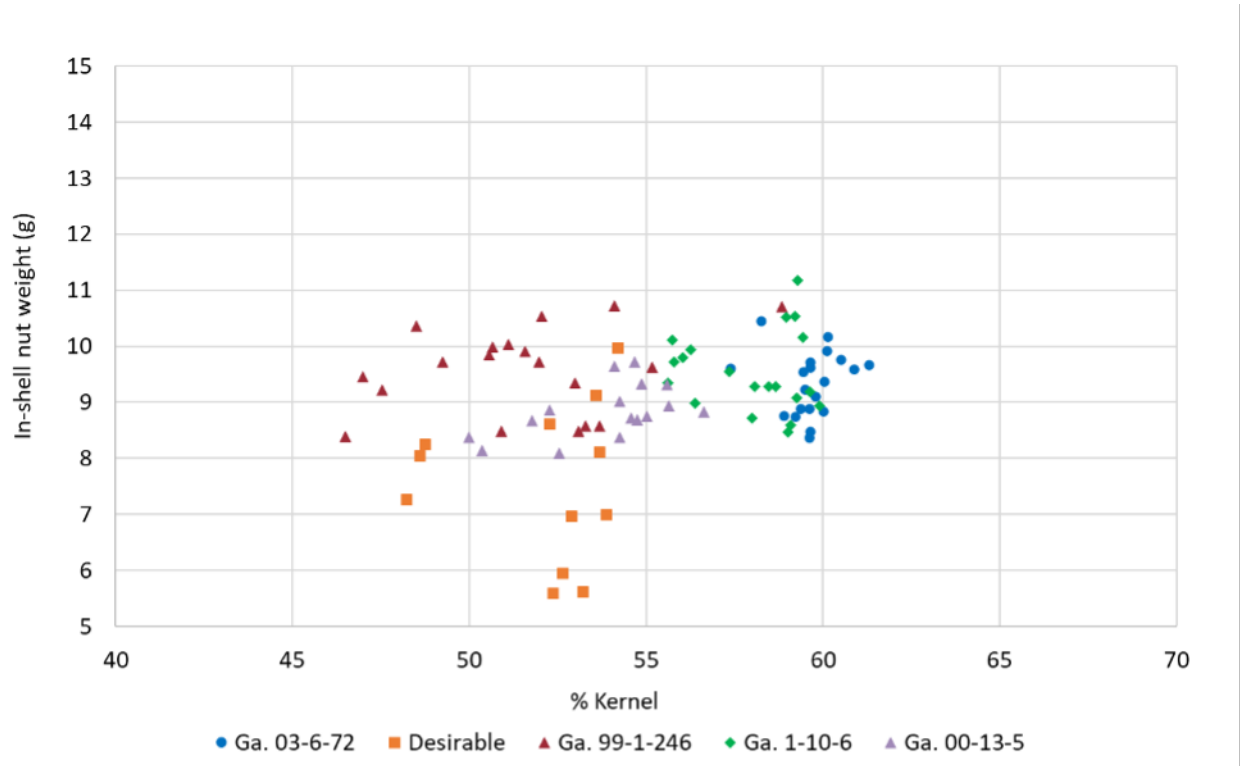

Figure 4. Nut size (g) and percent kernel of pecan genotypes in Berrien Co., GA in the fifth through ninth year of growth (2018-2022). Each point represents the nut quality of a single tree nut sample for a given year.

Figure 5. Shuck, nut, and kernel of Ga. 03-6-72 pecan.

Figure 6. Nuts and kernels of Ga. 03-6-72 pecan.

of scab infection (Table 2) which reduced nut yield and quality. 'Ga. 03-6-72' would thus provide an option to growers who would like to grow a pecan cultivar with excellent quality and reduce the number of fungicide sprays applied to their orchard. In the minimally sprayed trial in Tift Co., mild levels of scab infection were seen (Table 3). While scab infection ratings of 'Ga. 03-6-72' were not statistically higher than the strongly resistant cultivars Ga. 00-7-75 and Elliott, scab infection was easily observed in most years on Ga. 03-6-72 but was rare in 'Ga. 00-7-75' and not seen in 'Elliott'. In the same trial, scab infection was much lower on 'Ga. 03-6-72' than in commonly planted susceptible cultivars such as Desirable, Pawnee, Stuart, and Zinner and also better than Sumner which is considered to have good levels of scab resistance (Wells and Conner 2012). Overall, 'Ga. 03-6-72' appears to have good resistance to pecan scab, but growers should still expect to apply a moderate number of fungicide sprays to keep trees free from scab while also controlling other fungal pathogens.

'Ga. 03-6-72' was among the cultivars with the lowest levels of black pecan aphid damage, similar to 'Ga 03-6-32', which has the same parentage (Table 3). Sooty mold accumulation was similar to most other cultivars tested (Table 3). Time of spring bud break in 'Ga. 03-6-72' is later than 'Huffman' and similar to 'Sumner' (Table 1) which indicates low frost susceptibility if planted in the northern Georgia. Ga. 03-6-72 is protogynous in flowering (type II) with mid-season pistil receptivity and mid-season pollen shed (Fig. 7). It would be pollinated by and pollinate 'Desirable', 'Pawnee', 'Caddo' 'Cape Fear', and 'Creek'. Time of 50% shuck split in Tift Co. is in the first week of October and about 3 d earlier than 'Desirable', giving 'Ga. 03-6-72' an early mid-season harvest date.

Availability

'Ga. 03-6-72' will be a patented cultivar (USPP applied for) and is owned by the University of Georgia Research Foundation. Propagation rights are controlled by the University of Georgia Research Foundation, Technology Commercialization Office, Terrell Hall, Athens, GA 30602-7411 (www.ovpr.uga.edu/tco/). A list of nurseries licensed to propagate 'Ga. 03-6-72' pecan can be obtained by contacting the author.

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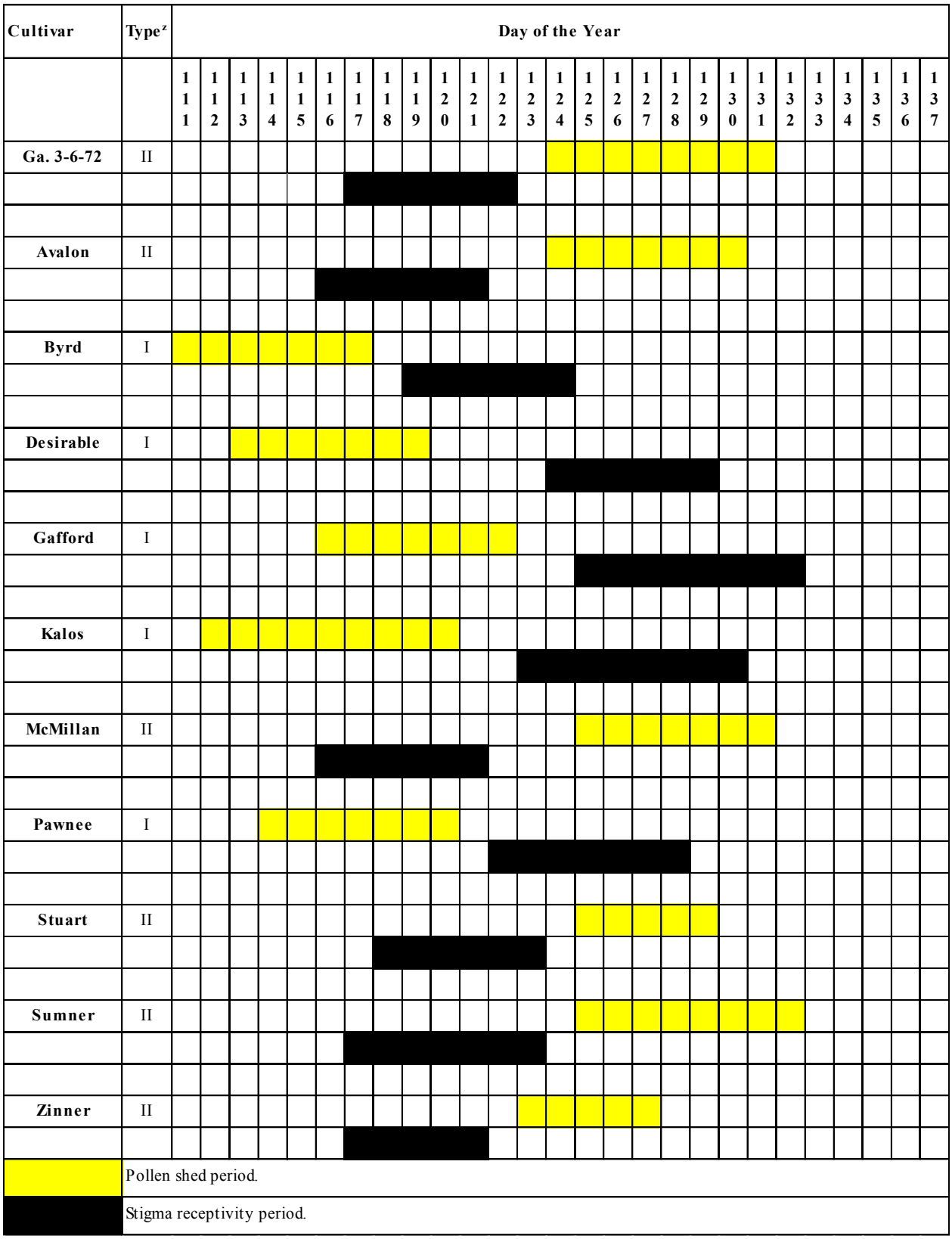

[z]Type I = protandrous, Type II = protogynous.

Figure 7. Pollination charts for Ga. 03-6-72 and other pecan cultivars.

Literature Cited

Brock J. Pecan. In: Little EL, editor. Georgia Plant Disease Loss Estimates. University of Georgia Extension; 2018. pp. 14.

Conner P. 2022. 'Kalos', a new pecan cultivar for commercial orchards in the southeastern United States. Hortscience 57:367-371. https://doi.org/10.21273/HORTSCI116369-21.

Conner P, Thompson T. 2003. Performance of nine pecan cultivars and selections in southern Georgia. J. Amer. Pom. Soc. 57:115-120. https://doi.org/10.71318/apom.2003.57.3.115.

Goff B. 1999. Two USDA cultivars that should be planted more in the Southeast. Pecan South 32(11):4

Madden G. 1974. USDA develops 14 main varieties. Pecan Quart. 8:5-10.

McEachern G. 1998. 'Sioux' for central Texas. Pecan South 30(12):7-8.

Sparks D. 1997. 'Desirable' pecan. Fruit Var. J. 51:2-7. https://doi.org/10.71318/apom.1997.51.1.1.

Wells L, Barman A, Brenneman T, Grey T, Hudson W, Mitchem W, Sawyer A. 2025. 2025 Commercial pecan spray guide. Univ. of Georgia College of Agr. Bul. 841.

Wells L, Conner P. 2012. Pecan varieties for Georgia orchards. Univ. of Ga. Coop. Ext. Circ. 898.

Wetzstein H, Sparks S. 1989. Stigma-pollen interactions in pecan. J. Amer. Soc. Hort. Sci. 114:355-359.