



Phenology, Growth, Yield, and Quality of ‘Imperial Star’ Artichoke under Florida’s Subtropical Climate

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Artichoke (*Cynara cardunculus* var. *scolymus* L.) is adapted to a Mediterranean climate and requires the accumulation of 200 to 500 hours below 7.2 °C for vernalization. Although subtropical climates in Florida provide insufficient chill hours to induce flower bud formation in artichoke, we have previously demonstrated that this chilling requirement can be overcome by spray applications of gibberellic acid (GA₃) during the vegetative growth stage. The objective of this study was to evaluate the potential of artichoke as a viable alternative crop in Florida by characterizing phenology, growth, yield, and bud quality of ‘Imperial Star’ artichoke plants grown in Balm, FL. Seedlings were transplanted on 2 Oct. 2017 and quickly established in the field with rosette leaves. Spray applications of GA₃ were performed at 49 g/ha three times between 15 Nov. and 13 Dec. On 18 Dec., plants were 33.0 cm high and 58.2 cm wide with 9.1 leaves. The first bud formation occurred on 1 Jan. 2018. Bud formation at more than 80% was observed by Jan. 10, and reached 100% on Jan. 23. Harvests were performed 11 times between 31 Jan. and 12 Mar. Marketable yield was 6.41 t/ha with 3.9 buds/plant. Initial main buds were large and very compact, weighing up to 360 g. Both bud size and quality declined over the harvest season. These results suggest that, with GA₃ and optimal management practices, Florida can produce high quality artichoke buds in January and February, when market prices are highest because of low domestic supply.

Globe artichoke (*Cynara cardunculus* var. *scolymus*) is a thistle-like plant in the Asteraceae family and is cultivated for its edible flower buds, which are known for their high antioxidant content and beneficial health effects (Shinohara et al., 2011). Artichoke is adapted to a Mediterranean climate characterized by mild, moist winters. In the United States, it is reported that California produces over 90% of the total market for artichokes with a retail price ranging from \$1.50 to \$5.00 per head (USDA, 2016). In California, the production value of artichoke was \$11,853 per acre in 2015, which is higher than that for most vegetable crops in Florida, including watermelon, cucumber, snap bean, squash, cantaloupe, and cabbage. Previous studies have shown that artichoke can be grown successfully in the relatively warmer climate in Southwest Texas (Leskovar et al., 2013; Leskovar et al., 2006). Although artichoke requires the accumulation of 200 to 500 chill hours below 7.2 °C for vernalization, our preliminary experiments demonstrated that one low chill cultivar, ‘Imperial Star’, can be grown in Florida with a vernalization technique using gibberellic acid (GA₃) (Agehara, 2017). However, there is very little information available regarding basic production guidelines for artichoke in Florida. The objective of this study is to examine the phenology, growth, and yield of ‘Imperial Star’ artichoke grown under a subtropical climate in Florida.

Materials and Methods

On 2 Oct. 2017, a field trial was initiated at the University of Florida/IFAS Gulf Coast Research and Education Center in

Balm, FL, using a low chill cultivar, ‘Imperial Star’ (Fig. 1). The study consisted of 20 plants of ‘Imperial Star’ (Johnny’s Seeds, Waterville, ME) transplanted in black plastic mulch on a Myakka fine sand siliceous hyperthermic Oxyaquic Alorthod soil with drip irrigation. Plant spacing was 91 cm and 152 cm within and between rows, respectively, on planting beds that were 81 cm wide at the base, 71 cm wide at the top, 25 cm high, and spaced 152 cm apart. Prior to planting, raised beds were fumigated with Pic-Clor 60 (TriCal, Inc., Hollister, CA) at 336 kg/ha and preplant fertilizers were incorporated in the soil at 56N–49P–93K kg/ha.



Fig. 1. Experimental field of ‘Imperial Star’ artichokes in Balm, FL.

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During the growing season, additional fertilizers were applied weekly via drip irrigation at 7.8N–1.1P–4.3K kg/ha. All plants were sprayed with GA₃ (ProGibb LV Plus, Valent BioSciences, Libertyville, IL) at a rate of 49 g/ha three times every 2 weeks, beginning at 44 days after transplanting (DAT). Pesticides were applied as needed to control caterpillars and mites. The date of bud break was recorded for each plant from 1 Jan. to 16 Mar. 2018. Plant canopy height and width were measured on the three center plants of each plot every 6 weeks (on 18 Dec., 30 Jan., and 16 Mar.). Harvests were performed 11 times between 31 Jan. and 12 Mar. 2018 and graded according to the U.S. Dept. of Agriculture (USDA) grading standards (USDA, 2006). Bud weight of the whole artichoke bud, the heart, and stem were measured during the entire harvest period for the first two main and secondary buds per plot.

Results and Discussion

On 18 Dec. 2017 (77 DAT), ‘Imperial Star’ artichoke plants were 33.0 cm high and 58.2 cm wide with 9.1 leaves (data not shown). The first bud formation occurred on 1 Jan. 2018 (91 DAT) and achieved 100% bud break by 23 Jan. (113 DAT) (Fig. 2). Total cumulative yield was 9.01 t/ha with a marketable yield of

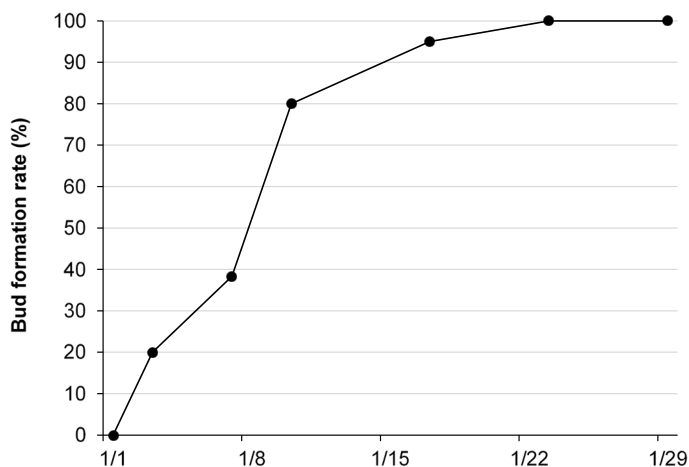


Fig. 2. Bud formation was observed at more than 80% by 10 Jan. and reached 100% on 23 Jan. 2018 for ‘Imperial Star’ artichoke in Balm, FL.

Table 1. Yield of ‘Imperial Star’ artichoke grown in Balm, FL.

Cultivar	Marketable yield				Total yield (t/ha)
	Bud number (no./plant)	Bud size (g)		Yield (t/ha)	
		Average	Largest		
Imperial Star	3.87	231	360	6.41	9.01

6.41 t/ha and an average of 3.87 buds/plant (Table 1). Bud size averaged 231 g with the largest bud weighing 360 g. Both bud size and quality declined over the harvest season. Importantly, peak harvests of main heads occurred between 7 and 19 Feb. and 2018 (128–140 DAT), when market prices are highest in the United States because of low production in California. These results suggest that artichoke has high potential to become a niche alternative crop in Florida. Selecting low chill cultivars such as ‘Imperial Star’ combined with artificial induction of bud formation using GA₃ is critical to obtain high artichoke yields under insufficient chill conditions in Florida. Furthermore, high yields can be achieved by optimizing management practices, such as plant spacing (91 cm in-row plant spacing), irrigation (5.6–11.1 L/plant/day), and fertilization (250N–112P₂O₅–224K₂O kg/ha).

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