the earliest stone age, a period estimated to have ended at about 14,000 B.C.

They discovered impressed in that river bed the leaves and seeds of a palm. The seeds were as small as coffee beans, but they had a groove which revealed that it was a palm related to the date palm, *Phoenix*.

It was publicized as the seed of the *Phoenix sylvestris*. But later, in 1952, the authors changed their opinion and thought it possibly was the Central African palm.

Which is right? We don't yet know. But if India's famous wild *P. sylvestris* was found in Africa, then Africa could be the cradle of the date palm as well as Iran-Baluchistan.

But whatever the truth, the fact remains that the Mediterranean race of men was the bearer and the disperser of the date palm culture. The two are one and will likely always be that way.

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Effects of Several Plant Growth Substances on Height, Flowering, and Lateral Shoot Development of Chamaedorea seifrizii

TIMOTHY K. BROSCHAT AND HENRY DONSELMAN
University of Florida, IFAS, Research and Education Center, 3205 College Avenue, Ft. Lauderdale, FL 33314

Chamaedorea seifrizii Burret. is one of the most important palm species used in America as an indoor plant. This species grows fairly rapidly and suckers, producing fuller containers during production and withstands the low light intensities of interiors.

Pots containing numerous canes are preferred by buyers, so growers often plant 15 or more seedlings in a 25 cm diameter container. Seed, as well as the labor to transplant numerous seedlings, is a major expense in the production of this palm. It would be desirable to enhance chemically the natural suckering ability of these palms, thereby reducing the number of seedlings required to produce a full, attractive container.

At approximately 100 cm in height, *C. seifrizii* plants mature and begin to flower. These palms usually retain their lower leaves until they begin to flower and the developing inflorescences in the leaf axils force the abscission of all but the youngest 5 or 6 leaves. Rapid growth, though desirable in commercial palm production, can result in excessively long internodes that further detract from the appearance of the palm. Chemical inhibition of flowering and internode elongation in *C. seifrizii* would be a valuable tool for commercial producers of this palm.

Little work has been done on the effects of various classes of plant growth substances on palm growth parameters. The effects of gibberellic acid (GA) applications on fruit characteristics of date palm (*Phoenix dactylifera* L.) have been reviewed by Mohammed (1985), but no other morphogenetic effects due to GA application were reported for this species. Fisher (1980) applied GA, as well as sev-

eral growth retardants, on 6 species of palms to induce juvenility and found GA to be effective in some species, including *C. seifrizii*. None of the materials he used had any obvious effect on lateral shoot development in any palm species, however. In the present study, several different classes of plant growth substances (gibberellins, cytokinins, auxins, and an ethylene releasing compound) were applied to *C. seifrizii* to determine their effects on lateral shoot development, plant height, and flowering in this species. Since high light intensities are known to promote lateral shoot development in other monocots such as *Dracaena marginata* Lam. (Donselman and Broschat 1982), this variable was also investigated for *C. seifrizii*.

Materials and Methods

One year old *C. seifrizii* seedlings were planted one per 15 cm diameter container and grown under 63% shadecloth. Plants grown in a Canadian peat, perlite, sand, cypress shavings medium (8:5:2:5, by volume) amended with 880 g m^{-3} Micromax® (Sierra Chemical Co., Milpitas, CA) and 8.3 Kg m^{-3} dolomite. Containers were fertilized with 18 g Osmocote® 18-6-12 (Sierra Chemical Co.) at 4 month intervals and approximately 2 cm of water was applied daily by overhead irrigation. Ten replicate plants were assigned to each of the following treatments which were applied as foliar sprays at monthly intervals for 1 year: control (water only) benzyl adenine (BA) at 200 mg/l and 500 mg/l, Ethephon at 200 mg/l and 500 mg/l, GA at 50 mg/l and 200 mg/l, and naphthalene acetic acid (NAA) at 1.0 g/l and 2.5 g/l. An additional 10 plants received no foliar sprays, but were grown in full sun and otherwise received identical treatment to shade-grown control plants. After one year, all plants were measured for height, number of lateral shoots, and number of flowers.

Table 1. Effects of various plant growth substances on suckering, height, and flowering of shade-grown C. seifrizii.

Treatment	No. Lateral Shoots	No. Flowers	Height (cm)
Control (water only)	5.3 ab[z]	2.2 ab	161.5 a
BA (200 mg/l)	5.9 ab	2.4 a	153.4 a
BA (500 mg/l)	6.6 a	2.6 a	163.4 a
Ethephon (200 mg/l)	5.6 ab	2.1 ab	127.7 b
Ethephon (500 mg/l)	6.2 a	1.1 bc	93.0 c
GA (50 mg/l)	5.8 ab	2.0 ab	156.8 a
GA (200 mg/l)	6.0 a	2.3 a	154.1 a
NAA (1.0 g/l)	6.6 a	2.0 ab	149.1 a
NAA (2.5 g/l)	4.9 ab	1.5 ab	158.9 a
Full sun	3.8 b	0.3 c	66.8 d

[z] Mean separation within columns by Waller-Duncan K-ratio method, 5% level. Means followed by the same letter are not significantly different.

Results and Discussion

Height of palms grown in full sun was about half that of shade grown plants (Table 1). Palm height was inversely related to the concentration of Ethephon applied, with palms treated with Ethephon at 500 mg/l less than 60% as tall as control plants. No other chemical treatments significantly enhanced or reduced stem elongation in *C. seifrizii*. Fisher (1980) found that Ethephon significantly reduced petiole elongation and leaf blade length in African oil palm (*Elaeis guineensis* Jacq.) but other growth retardants such as chlormequat and daminozide had no such effects. Leaf size was also reduced in *C. seifrizii* by Ethephon in that study.

Mean number of lateral shoots in *C. seifrizii* ranged from 6.6 for plants sprayed with NAA at 1 g/l and BA at 500 mg/l to 3.8 for plants grown in full sun (Table 1). Differences among chemical treatments with respect to number of lateral shoots were not statistically significant, however. Lateral shoot development in *Dieffenbachia* and *Spathiphyllum* has been enhanced by spraying with BA

(Henny and Fooshee 1985, Wilson and Nell 1983), but this was not true for *C. seifrizii*. Although lateral shoot development in *Dracaena marginata* is known to be promoted by growing the plants under high light intensities (Donselman and Broschat 1982), *C. seifrizii* grown in full sun produced fewer lateral shoots than shade grown plants.

Palms grown in full sun had significantly fewer flowers than shade grown palms (Table 1), but also grew more slowly and therefore may not have reached the physiological stage of maturity required for flowering. Ethephon sprayed at 500 mg/l appeared to have some inhibitory effects on the flowering of *C. seifrizii*, but there was no reduction in flowering by any other chemical treatment. GA is known to promote flowering in Aroids (Henny 1981), but there was no significant enhancement of flowering in *C. seifrizii* by this compound.

In conclusion, Ethephon sprays applied monthly at concentrations of 500 mg/l had the most significant and beneficial effects on *C. seifrizii*. This treatment retarded elongation and reduced the incidence of flowering, but had little effect on lateral shoot development. It is doubtful, however, that these rather small effects on palm growth characteristics by Ethephon would justify the commercial use of this material in *C. seifrizii*. Growing these palms in full sun also appeared to inhibit flowering and decreased growth rate, but overall plant quality in sun grown *C. seifrizii* was considered unacceptable for foliage plants.

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