and it is important to use this resource carefully. During 1999, an experiment of drip irrigation in asparagus was conducted. Three treatments were applied: 50%, 75%, and 100% of the evaporation from a pan evaporation type A. The results of the statistical analysis indicated that the best treatment was 100% with a yield of 517 boxes/ha and 183 cm of water applied. The lowest yield (290 boxes/ha) was with 50% and 91 cm of water applied.

298

Biosolids and Soil Solarization Effects on Bell Pepper (*Capsicum annuum*) Production and Soil Fertility in a Sustainable Production System

*Monica Ozores-Hampton**, *Phillip A. Stansly*, and *Thomas A. Obreza*; University of Florida/IFAS, Southwest Florida Research and Education Center, 2686 State Road 29 North, Immokalee, FL 34142-9515

Methyl bromide will be unavailable to conventional vegetable growers in the year 2005, and it cannot be used by organic growers. Chemical alternatives are more expensive and may also be subject to future restrictions. Non-chemical alternatives like solarization and organic amendments are as yet largely unproven but do offer promise of sustainable solutions free of government regulation. The objective of this study was to evaluate the effects of soil-incorporated biosolids and soil solarization on plant growth, yield, and soil fertility. Main plots were a biosolids soil amendment (37 $Mg \cdot ha^{-1}$and a non-amended control. Treated main plots had received some type of organic amendment for the previous 6 years. Sub-plots were fumigated with methyl bromide as they had been for 6 years, or non-fumigated. Non-fumigated plots were further split into solarized and non-solarized plots. Bell pepper (*Capsicum annuum* 'X 3R Aladdin') was grown for 8 months. Nitrogen fertilization was reduced to 50% of the recommended rate in the biosolids plots due to expected N mineralization from the biosolids amendment. Plant biomass was higher in the biosolids plots compared with the non-amended plots but there were no differences in marketable pepper yields between biosolids and non-biosolids plots. Plants grown in solarized soil produced lower plant biomass and yields than the methyl bromide and non-fumigated treatments. Soil pH and Mehlich 1-extractable P, K, Ca, Mg, Zn, Mn, Fe, and Cu were higher in biosolids plots than in non-amended control plots. Soil organic matter concentration was 3-fold higher where biosolids were applied compared with non-amended soil. The results suggest that regular organic amendment applications to a sandy Florida soil can increase plant growth and produce similar yields with less inorganic nutrients than are applied in a standard fertilization program. However, methyl bromide and non-fumigated treatments produced higher yields than soil solarization.

299

Effects of Plant Growth Regulators on Heat Stress in Annual Artichoke Production

*Wayne L. Schrader**; Univ. of California Cooperative Extension, 5555 Overland Ave., Bldg. 4, San Diego, CA 92123-1219

Artichoke is a cool-season perennial crop that is grown as an annual from seed in southern California. Growing artichokes as annuals from seed allows growers to harvest during the winter from November to March. Artichoke seed is planted in May, transplants are moved to the field in July, and harvesting begins as early as November in years with relatively cool fall weather. Hot fall weather during September and October suppresses plant growth and causes premature flowering, which lowers yield and average bud size. Plant growth regulator (PGR) treatments were evaluated in annual artichokes to determine if they could reduce the adverse effects of hot weather during September and October. Treatments included multiple applications of apogee (gibberellin inhibitor), retain (ethylene inhibitor), apogee + retain, cytokinin, and control plots. Harvestable buds were counted as a measure of earlier flowering induced by hot weather. Apogee and cytokinin show promise in reducing heat stress during hot fall artichoke production. Other PGR treatments increased the number of harvestable buds compared to control plots.

300

Effects of Plant Growth Regulators on Eggplant (*Solanum melongena* L.) Yield

*J. Pablo Morales-Payan**; Universidad Nacional Pedro Henriquez, Urea/Aosciedad Dominicana de Investigadores Agropecuarios y Forestales, Inc., Santo Domingo, Dominican Republic

Field studies were conducted in the Dominican Republic to determine the effect of several plant growth regulators on the yield of 'Jira' eggplant. Treatments consisted of aqueous solutions of folcysteine (25, 50, 75 ppm), giberellic acid 3 (10, 20, 30 ppm), kinetine (25, 50, 75 ppm), naphthalenacetic acid (NAA) (25, 50, 75 ppm), 2,3,4-dichloro-phenoxy-triethyl-amine hydrochloride (DCPTA) (25, 50, 75 ppm), triacontanol (5, 10, 15 ppm), ethanol (5, 10, 15%), and chlormequat (50, 100, 150 ppm) sprayed at early flowering, directed to the crop upper leaves and flowers. A control treatment (no plant growth regulators applied) was also included. A randomized complete-block design with four replications was utilized. Experimental units were two rows of 10 plants at a 1.0 x 0.4-m distancing. Eggplant fruit set and yield were determined after 10 harvests performed at 3-day intervals. Analysis of variance and mean comparison tests were performed on the resulting data. 'Jira' eggplant fruit set and yield was significantly improved by folcysteine, giberellic acid 3, and NAA, but not by kinetine, DCPTA, ethanol, triacontanol, or chlormequat. Eggplant yield increased as folcysteine rate increased from 0 to 50 ppm, but no further yield increase was obtained when increasing the rate from 50 to 75 ppm. Similarly, eggplant yield significantly increased as gibberellic acid increased from 0 to 20 ppm, but not when rates increased from 20 to 30 ppm. With NAA, eggplant fruit set and yield significantly increased above that of control plants when 25 ppm was applied, with no significant yield increase at higher rates. Results indicate that the yield of 'Jira' eggplants could be enhanced by the treatments with either folcysteine, NAA, or gibberellic acid hereby described.

301

Gibberellic Acid (GA_3) and Light Affect Germination of *Echinacea angustifolia* Seeds

Keun Ho Cho[1], *Chiwon W. Lee*[1], and *Kyu-Min Lee**[2]; [1]Dept. of Plant Sciences, North Dakota State Univ., Fargo, ND 58105; [2]Dept. of Horticultural Science, Sang Myung Univ., Chonan, Chungnam, 330-180, South Korea

The narrow-leaved purple coneflower (*Echinacea angustifolia*) produces echinacin and related compounds in the root, which are known to have immune and curative properties against viral, fungal, and bacterial infections. In recent years, cultivation of this species has increased in response to growing market demand for natural medicinal remedies. The objective of this study was to determine the influence of gibberellic acid and light on the germination of *E. angustifolia* seeds. Seeds soaked for 24 h in 0, 1, 5, 10, 50, 100, 250, 500 or 1000 mg/L GA_3 solution were germinated on Whatman #1 filter paper inside petri dishes at 22 °C with or without light (80 $\mu mol \cdot m^{-2} \cdot s^{-1}$) for 21 days. The seeds germinated poorly in dark with the final percent germination range from 10% (GA_3 1000 mg/L) to 36% (GA_3 250 mg/L). Under light, seed germination showed a quadratic response (r = 0.84) to GA_3 concentration. Percent germination exceeded 90% at 10, 50, and 100 mg/L GA_3 with the mean time (T_{50}) to germinate varying at 10.5, 11.7, and 13.3 days, respectively, under light. Seed germination under light was <10% when treated with 500 and 1000 mg/L GA_3. In general, seed germination was best when treated with 10 or 50 mg/L GA_3 under light. Results of this research may well be used in enhancing seed germination during field establishment of *E. angustifolia*.

302

Comparative Effectiveness of Cytokinins on Quality of Soybean Sprouts

Hae-Jeen Bang, *Soo-Jung Hwang*, *Hee Chung*, and *Jung-Myung Lee**; Dept. of Horticulture, Kyung Hee University, Yongin 449-701, Republic of Korea

Soybean sprouts are one of the most-favored traditional vegetables around the world. The sprouts are usually consumed 7 to 10 days after sowing depending upon the growing conditions. High-quality sprouts should have less secondary roots, short and well-swollen hypocotyls in pure white color, and small cotyledons in hooked position. Cytokinins were reported to be effective in producing such sprouts by promoting sprout growth while inhibiting the excessive hypocotyl elongation and secondary root growth. Seeds of four soybean cultivars with different characteristics were soaked in water for 4 h and, 2 to 3 h after the imbibition, the seeds were soaked again in solutions of different cytokinins such as benzyladenine (BA), BA-riboside (BAR), BPA, 2iP, 2iP-riboside, 4-CPPU, and kinetin-riboside (KR) for 10 min. After the treatment, the sprouts were grown in a plastic tube (25 cm height x 10.5 cm diameter) a dark culture room with ample watering every 4 h. After 7 days of growth, uniform samples were taken from each treatment and the sprout characteristics were examined. Some cytokinins such as BA, BAR, 4-CPPU were highly effective in promoting the sprout growth (fresh weight) even though the hypocotyl length was markedly reduced. Other cytokinins such as 2iP, 2iPR, and KR had no effect on sprout growth. Hypocotyl diameter was markedly increased by BA and 4-CPPU treatment, thus resulting in short,