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Crops can be bred to resist weed competition if the traits that confer competitive advantage are known. Field experiments in 1999 and 2000 examined the competitive abilities of three cowpea [*Vigna unguiculata* (L.) Walp.] genotypes with similar maturity and vegetative vigor but that differed in growth habit. Iron-Clay (IC) grows erect, while IT89KD-288 is a semi-erect and UCR 779 grows prostrate. Three weed treatments were established for each cowpea genotype: weed-free, purslane planted within the cowpea row, or sunflower planted within the cowpea row. Light intensity above and below the canopies and leaf area index (LAI) and dry weights of each species were measured biweekly in 1999 and weekly in 2000. Sunflower reduced the amount of light that cowpea received and reduced cowpea yield. Cowpea reduced the light received by purslane but purslane had little effect on cowpea. Although the combined LAI of sunflower and cowpea was constant, the leaf area of cowpea was reduced when sunflower was present. Cowpea shoot dry weight was reduced by sunflower but unaffected by purslane, while both sunflower and purslane dry weight were reduced by cowpea varieties. Cowpea variety IC was the most tolerant and UCR 779 the most susceptible to weed competition. This suggests the erect growth habit may be more effective in suppressing weeds than the prostrate growth habit, although additional tests are needed to concretely establish the importance of growth habit apart from the influence of the genetic background of these lines.

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Biomass Yield of Winter Legume Cover Crops with and without Rye

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Legume cover crops in sustainable agricultural system can be beneficial in protecting the soil, in reducing fertilizer input costs and water pollution from fertilizer run-off. Additionally, there are indications that inclusion of rye in the mixture enhances the benefits of legume cover crops. Our objectives were to quantify the biomass yields of four cover crop treatments and to determine if a legume and rye mixture produces more biomass as compared to a pure stand of legumes alone. We conducted five experiments during l997–98 and l998–99 seasons with hairy vetch and crimson clover in pure and mixed stands (l:l ratio of legumes and rye) resulting in four cover crop treatments. Three experiments were planted during fall of l997 at Petersburg, King William County, and James City County and two experiments were planted in fall of l998 at Petersburg and Prince George County in Virginia resulting in five environments. The experiments were laid out as RCBD with four replications. During the following spring, 1 m^2 of each plot was harvested when legumes began to flower. Analysis of data combined over five environments indicated that environments and cover crop treatments significantly affected the biomass yield on dry weight basis. The interaction between environments and cover crop treatments was not significant. The mean biomass yield was 3l5 g/m^2 with a range of 25l to 387 g/m^2. Significant differences existed among the five environments with Prince George location during l998–99 being the highest yielding and King William County location during l997–98 being the poorest. The dry matter yield at Petersburg location during both l997–98 and l998–99 was similar. The dry matter yield of both crimson clover and hairy vetch were significantly enhanced by inclusion of rye in the mixture (274 vs. 332 g/m^2 for crimson clover and 284 vs. 37l g/m^2 for hairy vetch). Further details of these studied will be presented.

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Pepper Plant Growth and Yield in Alternative Production Systems

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Loss of methyl bromide soil fumigant and pressure on growers to reduce fertilizer usage has increased interest in modifying the intensive vegetable growing systems used in south Florida. Some of the potential methods which may be used as alternatives to these systems include use of composts and solarization. We are studying ways to combine these materials and methods into productive systems. Treatments were: solarized with aged yard trimmings as a mulch (OM), solarized with polyethylene mulch (SP); solarized with 56 mg·ha^{-1} compost incorporated and polyethylene mulch (SC); and the control treatment of methyl bromide fumigant with polyethylene mulch (MB). Total fertilizer rates were similar for all treatments, although the alternative treatments were fertilized through the drip system and the control with the grower's standard pre-plant banded. Plant biomass was measured by taking samples of whole plants 6 weeks after planting. Mean plant dry weights were 14.9, 14.3, 21.7, and 26.0 g for OM, SP, SC, and MB. The MB plants were larger, SC were medium, and OM and SP were smallest. Yields from one harvest were: 10.9, 13.9, 14.4, and 20.0 mg·ha^{-1} for OM, SP, SC, and MB, respectively. There were no significant differences in yields between alternative treatments, but yields of fumigated plots were higher than alternative treatments. There was no difference in fruit size between treatments (242, 259, 247, and 271 g for OM, SP, SC, and MB, respectively). Plants in the control treatment using methyl bromide and conventional fertilization were generally larger and more productive than the alternatives. This project is continuing to study the effects of these treatments over the longer term.

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Soil Solarization Affects Weed and Nematode Populations in a Large-scale Vegetable Production System

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Many growers rely completely on methyl bromide fumigant to manage soil pathogens, nematodes, and weeds. This growing system, which generally includes raised beds, polyethylene mulch and drip irrigation, has been very effective in producing high vegetable yields. Non-chemical alternatives such as solarization and organic amendments are as yet largely unproven, but do offer promise of more sustainable solutions free of government regulation. The objective of this research was to study the effects of long-term, large-scale use of sustainable methods on weed populations and nematodes on peppers (*Capsicum annuum* L.) and *cucumbers (Cucumis sativus* L.), utilizing soil solarization and organic amendments. The field experiment was conducted during 1998 and 1999 on a commercial vegetable farm in Boynton Beach, FL. Treatments consisted of 3 years of soil solarization with compost, 2 years of soil solarization with compost, 2 years of soil solarization without compost, and methyl bromide without compost as a control. A pepper crop was grown on the plots, followed by a cucumber crop. Compost did not affect weed or nematode populations. At the end of the cucumber crop, solarized treatments had higher percent weed cover, primarily bermudagrass (*Cynodon dactylon* L. Pers.), a warm season perennial weed, as compared with the methyl bromide system, which was dominated by redroot pigweed (*Amaranthus retroflexus* L.), an annual weed. Populations of the root-knot nematode (*Meloidogyne incognita*) fluctuated throughout the experiment. The lowest numbers occurred in the conventional system with methyl bromide. However, on each sampling date, nematode populations in at least one of the solarized systems were statistically similar to those in the methyl bromide-treated plots. Soil solarization was effective in controlling annual weeds, but failed to control perennial weeds. Nematodes were controlled by both soil solarization and methyl bromide.

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Effect of Soil Solarization on Survival of Arbuscular Mycorrhizal Fungi in Western Mexico

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Soil solarization is used for pathogens control in horticultural production. However, if this technique reduce the fungi populations in soils probably also affect the beneficial microorganisms such as mycorrhizae arbuscular fungi. In this study was evaluated the effect of soil solarization on the viability of indigenous fungi and *Glomus intraradices*. Experiment was carried out in a sandy soil. 21 beds were prepared and covered with transparent polyethylene film 150 m thick as a single layer. Previously 30 g of inoculum *G. intraradices* was introduced at 20-cm depth in a nylon bag. Soil moisture was maintained at 70% hold capacity and monitored by tensiometer. Soil temperatures were registered at 08:00, 13:00 and 18:00 at 5, 10, and 20-cm depth. Solarization treatments of 0, 2, 4, 6 and 8 weeks were carried out in plots with three beds 5 m long and 0.80 m wide. The experiment was conducted in a randomized block design with 4 replicates. Soils were sampled in the central bed at 20-cm depth to the end of each period of soil solarization. After this sampling, *Glomus intraradices* and the mean of indigenous MA fungi were used for inoculation of bean plants grown in pots with sterilized soil and cultivated under greenhouse conditions. Results show that the soil solarization periods have a detrimental effect on viability and infectivity of AM fungi evaluated because of high temperatures in soil (more of 40 °C). Is suggested that is necessary the establishment of vegetable crops for transplant inoculated previously with AM fungi in greenhouse for restitution of beneficial microbial population.

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Effect of Soil Temperature on Viability of Arbuscular Mycorrhizal Fungi

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Soil solarization was developed primarily for controlling soil borne pathogens occur in soils used for vegetable crops production. Currently, it is not known whether arbuscular mycorrhizal fungal survive the solarization treatments and how is affected the viability and colonization capacity of inocula. In this study was evaluated the effect of several soil temperatures on the viability of indigenous fungi and *Glomus intraradices*. Experiment was carried out in metallic pots (4-kg capacity) containing sandy soil. 30 g of inoculum of *G. intraradices* (20.75 spores/g aproximately) was introduced at 20-cm depth in a nylon bag. Soil moisture was maintained at 70% of hold capacity and monitored by tensiometer. The metallic pots were then placed in a furnace and heated to 30, 35, 40, 45, and 50 °C and incubated for, 24, 48, and 72 hours and 0 hours as a control. Following heat treatment, the bag containing *G. intraradices* and a soil sample, for native AM fungi, were transferred into a pot (1-kg capacity) and sown with bean (*Phaseolus vulgaris*) seeds. Plants were grown in a greenhouse during 4 weeks. The experiment was conducted in a completely randomized design with 4 replicates. Results show that a temperature of 50 °C for 24 h affect AM spore viability, root colonization decrease from 14.48 to 2.71% for native AM fungi, and 10.52 to 3.05% for *G. intraradices*. At 45 °C, *G. intraradices* colonization was not affected. Control had a root colonization of 32.90% for native AM fungi and 23. 86% for *G. intraradices*. We suggest to study the effect of solarization on AM fungi colonization in field conditions.

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Effect of Compost Application on Strawberry Plant Growth and Fruit Quality

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Compost enhanced strawberry plant growth and fruit quality when used as a soil supplement. The combination of 50% soil plus 50% compost produced the greatest plant dry mass, fruit production, and fruit size in two strawberry cultivars ('Allstar' and 'Honeoye'). Compost also enhanced leaf chlorophyll content in strawberry plants. Nitrate reductase activity was increased in leaves and roots with the addition of compost. The greatest increases were seen when using 50% soil plus 50% compost. Strawberry fruit grown with compost had higher levels of N and K compared to fruit grown without compost. However, fruit grown with compost had lower levels of Mn, Fe, Mo, and Ni. With regards to heavy metals, addition of compost in the soil mix did not change Zn and Cd levels but did decrease Ni levels in fruit. Use of compost increased levels of organic acids (malic and citric acid), sugars (fructose, glucose, and total sugars), soluble solids content, and titratable acids content in both 'Allstar' and 'Honeoye' cultivars. Our results indicate that the use of composts can reduce the amount of fertilizer required for optimum strawberry plant growth.

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Topdressing Compost on Bermudagrass: Its Effect on Turf Quality and Weeds

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California's Integrated Waste Management Act (AB 939) required Californians to reduce landfill waste by 50% by the year 2000. This Act mandates that reduction be met through specific methods such as source reduction, recycling, and composting. Many municipalities have implemented a green waste pick-up and composting program as one method of solid waste reduction. From this green waste, thousands of tons of compost are generated each year. Methods to efficiently utilize it are being sought. Possible applications of compost could include topdressing compost on municipal turfgrass sites such as community recreation fields and parks. A field study on common bermudagrass [*Cynodon dactylon* (L.) Pers.] was conducted from Oct. 1994 through Dec. 1997 to compare topdressing composted municipal green waste and biosolids with conventional fertilizer applications, to determine optimum depth and timing of application, and to evaluate the benefits and risks of compost topdressing from cultural and financial perspectives. Turfgrass quality, color, and weed populations were evaluated. Other parameters measured included clipping yield, total nitrogen (N) content in clippings and soil, organic matter content in soil, and the effects on thatch development. Fertilizer and steer manure treatments were applied to yield 4 lb/1000 ft^2 (195.6 $kg \cdot ha^{-1}$) of N per year. Compost treatments included single or multiple applications per year at rates ranging from 1–8 lb/1000 ft^2 (48.9–391.3 $kg \cdot ha^{-1}$) of N. Topdressing composted green waste had a positive effect on turf. Quality and color were improved and summer grass weeds were reduced compared to untreated plots. Although thatch was not affected, an organic matter layer did develop causing an undesirable mounding effect. Compared to all treatments consistently higher turfgrass ratings and lower weed populations were observed with compost rates of 1110 lb/1000 ft^2 (24 t/a, 53.8 $t \cdot ha^{-1}$) topdressed four times per year.

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Alternative Methods of Raspberry Production and Root Rot Control

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Studies of alternative methods to control raspberry root rot (*Phytopthora fragariae* var. *rubi*) were conducted at Vancouver REU and in an organic growers' field (Pigman's farm) in last 2 years. The