The Montreal Protocol from 1991 defined methyl bromide as one of the prominent depletors of the Earth’s ozone layer, and ordered a phase out its use as a soil fumigant in developed countries by January 1, 2005. This international agreement permitted developing countries to continue the use of this fumigant for 10 additional years until 2015. An amendment to the protocol in 1992 established a phase-out program in developed countries by reductions of 25, 50, 75 and 100% from the 1991 domestic production level in 1999, 2001, 2003 and 2005 respectively. In 1997 the participants of the Montreal protocol agreed that there would be a justified need for transitional regulated use of methyl bromide and allowed limited critical use exemptions (CUEs) to be granted only if lack of access to methyl bromide or to economically feasible and environmentally acceptable alternatives would result in a significant failure of production and in market disruption. In addition to these restrictions the CUE applicants had to document feasible steps to minimize the use of methyl bromide and show good faith efforts in evaluating, commercializing and registering alternatives to methyl bromide. To comply with these requirements researchers have been conducting intensive testing of chemical and biological alternatives to methyl bromide as well as testing of the high barrier mulches and reduced rate application technologies.

Farmers in Miami-Dade County have challenges with some of the chemical methyl bromide alternatives in addition to those experienced by growers elsewhere in Florida. Thus, Telone products are excluded from use in this area and Vapam and Kpam have not always performed well in the County’s rocky-calcareous soils.
Some of the alternatives to methyl bromide were discussed recently during the Pepper Field Day at the UF IFAS TREC in Homestead (photo 1), which showcased a field trial conducted by W. Klassen, Q. Wang, Y. Li A. Palmateer, Merlyn Codallo and T. Olczyk as a part of a SARE grant focused on developing sustainable production systems for south Florida and Virginia. The following alternative production systems for bell pepper were demonstrated in this bell pepper replicated trial: sorghum sudangrass + plastic mulch, sorghum sudangrass + fumigation with Methyl Bromide and Chloropicrin (MC-33) + plastic mulch, sorghum sudangrass + herbicides (Dual Magnum & Devrinol) + organic mulch, sorghum sudangrass + organic mulch + plastic mulch and sorghum sudangrass + herbicides (Dual Magnum & Devrinol) + organic mulch + plastic mulch.

Photo 1 Evaluation of pepper plots, Field Day at UF IFAS TREC in Homestead, 4/5/2007

Sorghum sudangrass, seeded at the rate of 40 lb/acre, and was grown as a summer cover crop on all plots before application of other treatments. The organic mulch (Palm Beech yard waste compost) application rate was 14.4 tons/treated acre and the fumigation rate was 175 lbs/treated acre of MC-33 under metalized plastic mulch. Rates of Devrinol and Dual Magnum were 4 lbs/acre and 1 pint/acre respectively. Bell pepper transplants of the ‘Crusader’ cultivar were planted on January 2, 2007 in 2 rows per bed spaced 18 inches apart with 12 inches spacing between plants in the row. The length of each plot was 66 feet with four replications. The plots without plastic mulch were hand weeded 3 times. The fertigation rate was initiated at 0.5 lb/N/acre/day, stepped up to 2 lbs/N/acre/day, and later reduced to 1 lb/N/acre/day at the onset of flowering. One harvest has already been conducted and four more will be performed.
22 participants of the field day were able to evaluate the plots looking at plant size, canopy spread, potential yield and health of the plants in different treatments. According to the field day participants’ evaluations, the most interesting treatment was the organic mulch (Palm Beach compost) covered with plastic mulch.

The purpose of inserting a layer of organic mulch between the plastic mulch and the soil on the raised beds was to further improve the environment in the root zone by providing (1) a growth medium free of plant parasitic nematodes and pathogens for a portion of the roots of each transplanted seedling and (2) a continuous supply of nutrients. Also, in this arrangement the plastic mulch prevents rapid changes in moisture and temperature in the organic mulch and controls all weeds except nutsedges.

The previous trial conducted in the 2005-2006 growing season at a commercial vegetable farm resulted in the significantly highest yield of peppers from the identical treatment (sorghum sudangrass+ organic mulch + plastic mulch). Final conclusions will be made after completing all five harvests from this year trial located at TREC.

The preliminary data suggest that soil fumigation with MC-33 is not always essential for obtaining high pepper yields and that in many fields in south Florida, growing a dense cover crop in the summer followed by the use of combination of organic and plastic mulches can serve the same purpose. Cost - benefits considerations with respect to using organic mulch are as follow: the cost of transport from Palm Beach to Homestead at $6.25/ton was approximately $90.00 acre, and the cost of application was also about $90.00/acre. The cost of sorghum sudangrass seed and seeding was about $20.00/acre. The estimated total cost of cover crop + organic mulch (compost) was about $200.00/acre. Fumigation with MC-33 costs in excess of $700/acre. Thus for fields not significantly infested with nutsedges, the use of the cover crop + organic mulch in place of fumigation would save about $500.00/acre. For fields heavily infested with nutsedges, this system will have to be supplemented with chemical or biological controls, neither of which has been registered to date.