COVER CROPS & COMPOST – ALTERNATIVES TO METHYL BROMIDE FOR VEGETABLE PRODUCTION

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A series of field experiments has been being conducted at the Tropical Research and Education Center, Homestead, Florida to develop biologically based alternative systems to the use of methyl bromide in the production of winter-grown vegetables. Basically the alternative system consists of growing a nematode-resistant cover crop [cowpea (*Vigna unguiculata* cv. Iron Clay), velvetbean (*Mucuna deeringiana*) or sunn hemp (*Crotalaria juncea* cv. Tropic Sun)] in rotation with tomato, and covering the beds with plastic mulch. To facilitate comparison, the experimental design has also included sorghum sudangrass plots and fallow plots treated with MC-33 (mixture of methyl bromide with chloropicrin). In plots in which the nematode-resistant legume cover crops had been grown, 10 to 13 t/ha of biomass were produced and then incorporated into the soil (Fig. 1), tomato yields and the proportions of extra large and large fruits in plots with sunn hemp and cowpea incorporated were significantly higher than those in fallow plots treated with methyl bromide (Fig. 2 and Fig. 3). The nematode-resistant legume cover crops tended to suppress populations of parasitic taxa of nematodes and to spare populations of the free-living nematode taxa. A variation of this system would entail converting the nematode-resistant cover crop into an organic mulch and transplanting the tomato seedlings directly through the mulch. The problem to be overcome with this approach is weed growth through the organic mulch. In order to exclude light (which stimulates the germination of weed seeds), a compost was layered on top of the cover crop mulch at rates of either 50 or 25 t/ha (DW). These treatments strongly suppressed weed germination and growth, by 95% and 88% total dry weight of weeds over the control (fallow), respectively (Fig. 4). By contrast cover crop residues alone as organic mulches had a little effect on weed control (Fig. 5). Compost at given rates suppressed almost all kinds of weeds except nutsedge and garden spurge (Tab. 1).

We conclude that the use of nematode-resistant leguminous cover crops is a potential biological alternative to methyl bromide for vegetable production in subtropical areas. In addition it appears possible to create an organic mulch consisting of a layer of compost on top of the cover crop residue that suppresses weeds.

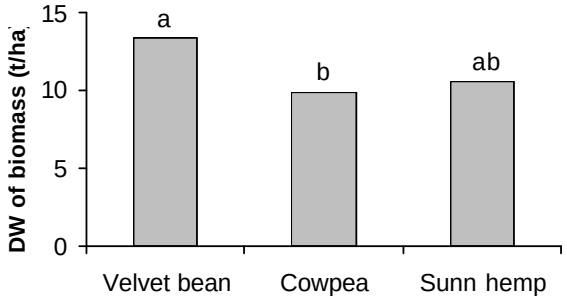

Fig. 1. Dry biomass produced by different leguminous cover crops

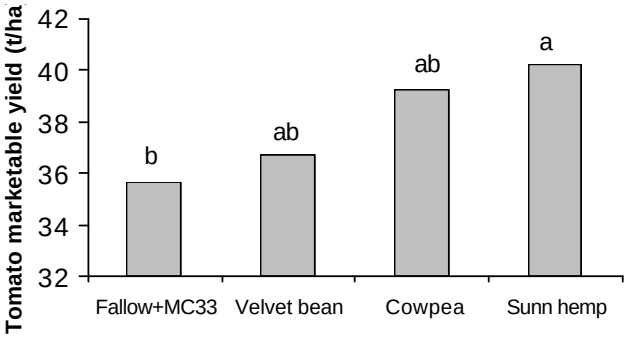

Fig. 2. Effect of cover crops on tomato marketable yields

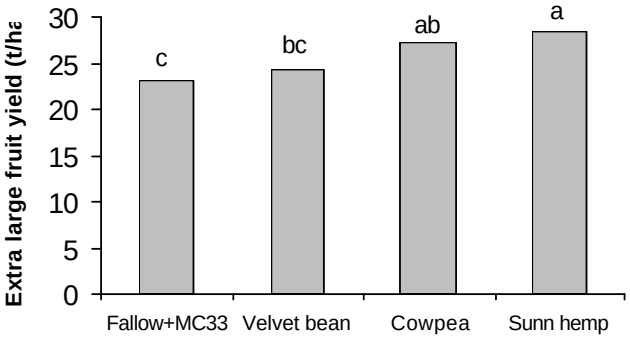

Fig. 3. Effect of cover crops on tomato extra large fruit yields

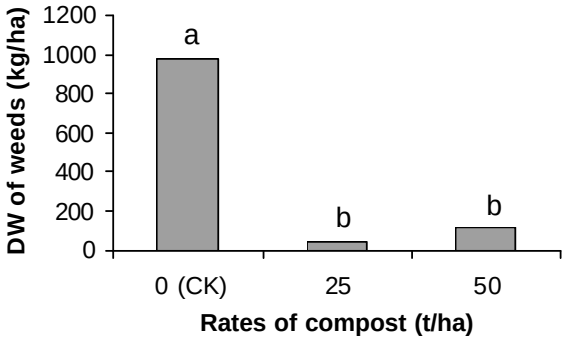

Fig. 4. Dry weight of weeds produced on beds with mulched with a layer of compost (2 rates) on top of the cover crop residue.

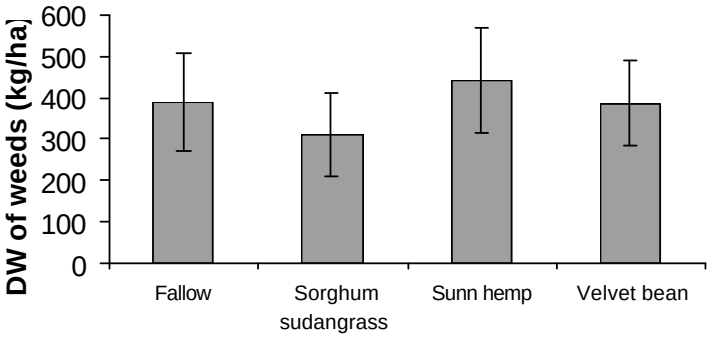

Fig. 5. . Dry weight of weeds produced on beds with mulched only with a cover crop residue.

Tab. 1. Effect of compost (kg/ha) for suppressing different weeds

Rates	Grass weeds	Amaranthus	Native clover	Milk weed	Nutsedge	Parthenium	Porcelain	Spurge
0	256.0[a]	84.6[a]	531.8[a]	8.6[a]	2.5[b]	89.4[a]	4.7[a]	4.8[b]
25	25.4[b]	0.56[b]	2.8[b]	0.8[b]	7.5[b]	0.3[b]	2.2[a]	4.7[b]
50	15.2[b]	0.0[b]	0.0[b]	0.8[b]	41.1[a]	0.0[b]	1.8[a]	58.2[a]

Note: It seems likely that spurge seed was transported to the beds as a contaminant in the compost.