EFFECT OF MIDAS (CHLOROPICRIN 62 %, METHYL IODIDE 33%) ON THE CONTROL OF *Meloidogyne incognita* (Chitwood) Kofoid and White IN GREENHOUSES OF SALTO, URUGUAY.

* R.F. Bernal Ing. Agr. MSc; National Institute of Agricultural Research, Salto Grande Experiment Station, Salto, Uruguay.

Uruguay has 400 hectares of protected vegetable crops in the north of the country dedicated to early production. In Salto area, the nematode problem is very important since crops, such as tomatoes and peppers almost have a ten-month of harvest period. Methyl bromide is used in greenhouse crops to disinfect the soil and to control nematodes and soil borne diseases. Farmers need rapid treatments for soil disinfection because their greenhouses are in production throughout the year. That is why sometimes they are not agree in using soil solarization alone or combined with a low rate of chemicals.

The root-knot nematode, *Meloidogyne incognita* (Chitwood) Kofoid and White, is a major limiting factor to vegetable production in Uruguay. Pre-plant soil fumigation with methyl bromide is the primary method for controlling this nematode.

Chemical alternatives that are available in Uruguay and have known broad-spectrum activities in soil are methyl bromide and methyl isothiocyanate (MITC) generators such as metam sodium. Each are used individually, but not are used as mixtures or in sequencial applications. Methyl iodide stands out for having good information on its level and broad spectrum of activity in soil that are similar to those of methyl bromide (3).

The objective of this study was to test MIDAS as a suitable and rapid alternative to methyl bromide for use in protected horticulture cultivation in Uruguay.

Materials and Methods

Experiments were made in two highly infected farms. Both have sandy loam soil. These greenhouses have a long history of nematode and some soil borne diseases. At the end of each crop, healthy, wilt and attacked plants with nematodes were counted. In all experiments, beds were covered with black mulch.

Farm I. Two greenhouses were used to test MIDAS (chloropicrin 62 %, methyl iodide 33%) and Methyl bromide (98%). Application date of chemicals: 8/7/2006.

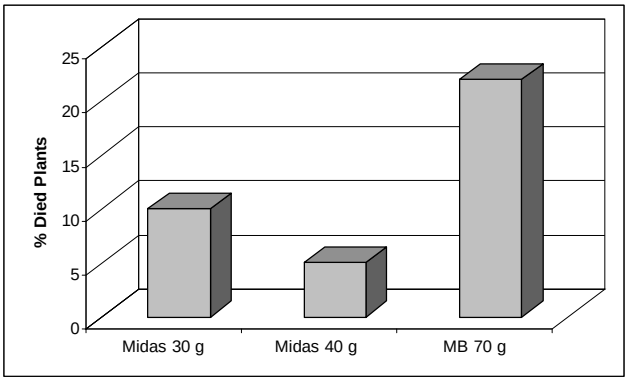
Greenhouse I: Tomato cv Hornero was planted. Two rates of MIDAS were tested at 30 and 40 g per m^2 of bed and one rate of Methyl bromide (98%) at 70 g per m^2 of bed. All treatments were repeated three times in a random block design and were applied through drip irrigation. There was one row of tomatoes per bed. Each plot consisted of five beds 1,5 m wide by 8 m long. Transplanting date of tomato: 8/17/2006. In this experiment there was not harvest of fruit. End of crop: 12/27/2006.

Greenhouse II: Melon cv Nitro was planted. Two rates of MIDAS were tested at 30 and 40 g per m^2 of bed and one rate of Methyl bromide (98%) 70 g per m^2 of bed. All treatments were repeated three times in a random block design and were applied through drip irrigation. There were two rows of melon per bed. Each plot consisted of five beds 1,5 m wide by 8 m long. Transplanting date of melon: 8/23/2006. End of harvest: 12/27/2006.

Results and Discussion

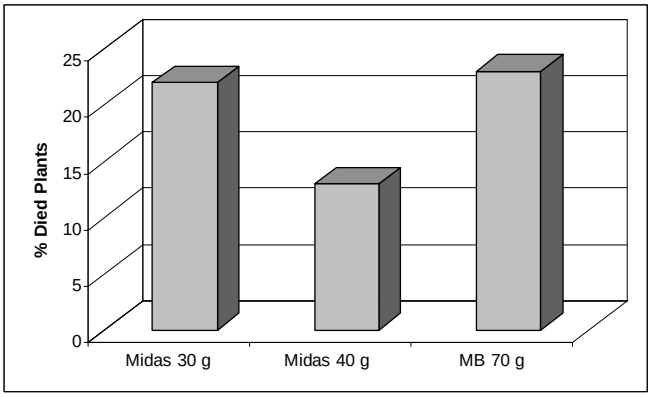
Tomato. After finishing the crop on 12/27/2006, all the tomato roots were evaluated and there were not attack of nematodos *Meloidogyne incognita* . Previous crop of tomato was highly attacked by *Meloidogyne incognita*, however, there was an excellent control of nematodes with MIDAS in this experiment.

Fig.1. Effect of treatments on *Ralstonia solanacearum*.



Inicial evaluation: 11/1/2006.

Fig.2. Effect of treatments on *Ralstonia solanacearum*.



Final evaluation: 12/27/2006

This farm has a long history of *R. solanacearum* attack on tomato and pepper crops. The effect of MIDAS to control *R.solanacearum* was significant (Fig. 1 and 2) although according to the previous information there would be not effect on this pathogen. This fact could be explained due to the high percentage of chloropicrin in the formulation of this chemical. Chloropicrin was used successfully to control *R.solanacearum* in tobacco crops in United States (1,2). Also, there was a better effect of control at a higher than a lower rate of MIDAS. This topic will be studied.

Melon. After finishing the crop on 12/27/2006, all the melon roots were evaluated and there were not attack of nematodos *Meloidogyne incognita*.

Table 1. Effect of different treatments on yield of melon cv. Nitro. 2006.

Treatments	Yield Kg. / Plot Average
1. MIDAS. 30 g / m^2	21.84 a *
2. MIDAS. 40 g / m^2	22.59 a
3.Methyl bromide 70 g / m^2	21.07 a

*Column means followed by the same small letter do not differ significantly according to Duncan's Multiple Range Test (P = 0.05).

MIDAS showed good performance and yield was almost equal or superior to Methyl bromide. There were not significant differences between both rates of MIDAS and Methyl bromide.

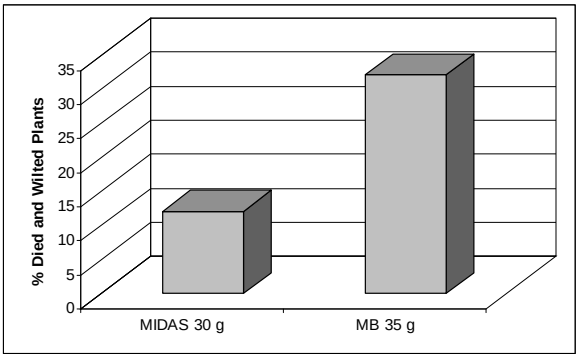
Farm II. One greenhouse was used to test MIDAS (chloropicrin 62 %, methyl iodide 33%) and Methyl bromide (98%). Application date of chemicals: 8/9/2006.
Greenhouse I: Melon cv Nitro was planted. One rate of MIDAS at 30 g per m^2 of bed was applied and Methyl bromide (98%) at 35 g per m^2 of bed was applied to compare both treatments. All treatments were repeated three times in a random block design and were applied through drip irrigation. There were two rows of melon per bed. Each plot consisted of five beds 1,5 m wide by 8 m long. Transplanting date of melon: 8/17/2006. In this experiment fruit was harvested. End of crop: 1/10/2007.

Table 2.Effect of different treatments on yield of melon cv. Packstart. 2006.

Treatments	Yield Kg / Plot * Average
1. Midas 30 g / m^2	47.26 a
2. Methyl bromide 35 g m^2	36.71 b

* LSD (0.05): 6.12

Fig 3. Effect of different treatments on nematode control on melon roots. Cv. Packstart.



Evaluation was done on 1/10/2007 at the end of crop.

In this experiment, MIDAS showed better yield and nematode control than Methyl bromide. There was not phytoxicity effect on melon crop. New experiments are carried out on 2007.

Literature cited.

1) Melton, T.A., D. Porter, and K.Wood. 1995. Reduced broadcast fumigant rates for control of Granville Wilt, 1994. In: Fungicide and Nematicide Tests. Amer. Phytopath. Soc.Vol.50: 280.
2) Melton, T.A., D. Porter, and K.Wood. 1995. Reduced fumigant rates for control of Granville Wilt, 1994. In: Fungicide and Nematicide Tests. Amer. Phytopath. Soc.Vol.50: 281.
3) Ohr, H.D., Sims, J.J., Grech, N.M. Becker, and McGiffen, M.E. Jr. 1996. Methyl iodide, an ozone-safe alternative to methyl bromide as a soil fumigant. Plant Dis. 80:731-735.