

pathogens and root knot nematodes. Simultaneously, mustard oil cake improves the fertility of the soil.

The soil amendment practices (use of sawdust burning, poultry refuse and mustard oil cake) are not only effective for controlling soil inhabiting pathogens and raising healthy seedlings, but are also highly profitable (Table 1).

Table 1. Economic benefit from using soil amendment practices for raising cabbage seedlings in farmers' fields (Taka/ha)

Treatment	Total cost	Total income	Income increased
Sawdust burning	1,03,240	13,80,400	12,77,160
Poultry refuse	1,01,080	8,12,800	7,11,720
Mustard oil cake	1,01,890	9,04,000	8,02,110
Farmers' practice (Cow dung @5t/ha)	1,08,990	5,68,610	4,59,620

The soil amendment practices are also equally effective and useful for production of healthy vegetables in the main field. Sawdust burning, poultry refuse or mustard oil cake should be applied only in lines or pits where the vegetable seedlings



will be planted. The rate of application of the materials and application technique should be the same as in the seedbeds. Results of on-farm trials



have shown that farmers' can achieve more than 1.5 times higher yield and as much income by using poultry refuse or mustard oil cake (Table 2).

The soil amendment practices that have been discussed here are environment-friendly, highly effective, inexpensive and affordable by the farmers. More important is that farmers can produce healthy vegetables by adopting these practices without pesticide use.

Table 2. Economic benefit from soil amendment practices in eggplant production in farmers' fields (Taka/ha)

Treatment	Total cost	Total income	Income increased
Application of poultry refuse	44,230	2,78,270	2,34,040
Use of mustard oil cake	45,105	2,66,145	2,21,040
Farmers' practice (Cow dung @5t/ha)	43,180	1,30,570	87,390

Prepared by:

Dr. M. A Rahman, SSO, HRC, BARI, Gazipur, and Dr. Sally, Miller, Ohio State university, USA

Edited by:

Dr. ANM Rezaul Karim, Site Coordinator, IPM CRSP Bangladesh and Dr. Ed Rajotte, Pennsylvania State University, USA

Collaborating Scientists:

M.S. Nahar, Iqbal Faruk and H.S. Jasmine.

For more Information:

Dr. M. A Rahman, SSO, HRC, BARI, Gazipur, Phone:9260497-8, Ext. 237

Dr. ANM Rezaul Karim, Site Coordinator, IPM CRSP Bangladesh Phone: 9256407



Soil Amendment Practices for Managing Soil-borne Diseases to Grow Healthy Seedlings of Vegetables and Crops in Bangladesh



Funded by USAID Grant No. LAG-G-00-93-00053-00. IPM CRSP is collaborated by BARC, BARI, BRRI, BSMRAU, DAE (PPW), CARE-Bangladesh, UPLB, AVRDC, IRRI, and US Universities to research and implement IPM practices for the benefit of Bangladeshi farmers.

September 2004

Soil Amendment Practices for Managing Soil-borne Diseases to Grow Healthy Seedlings of Vegetables and Crops in Bangladesh

In Bangladesh, seedlings of various winter vegetables such as tomato, eggplant, cabbage and cauliflower are widely grown during August and September. High temperature and high soil moisture prevailing during this period are highly conducive to proliferation of various soil inhabiting plant pathogens that infect and damage the vegetable seedlings. Healthy seedlings are hardly available in an infested seedbed, and transplanted diseased seedlings are unproductive. As a result, farmers frequently face serious problems in raising vegetable seedlings and often incur financial losses.

Trials carried out in farmers' fields through the IPM CRSP project in different areas of the country have shown that the use of saw dust burning and incorporation of mustard oil cake or poultry refuse in seedbeds or in vegetable fields can effectively control soil-inhabiting fungal and bacterial pathogens and root-knot nematodes.

Disease symptoms: Various species of fungal pathogens such as *Pythium*, *Rhizoctonia*, *Phytophthora*, *Sclerotium* and *Fusarium* severely damage seedlings of winter vegetables. The diseases caused by these fungi are known as foot rot, damping off and stem rot. Initially, water-soaked blackened lesions appear at the base of the seedlings, then the



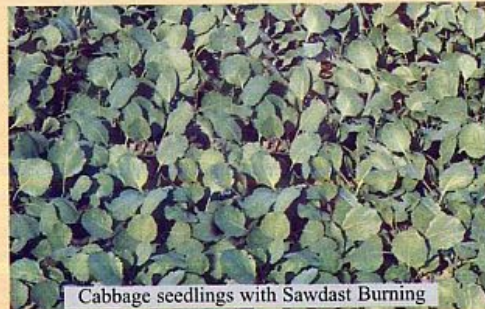
Damping-off symptoms: a. cauliflower, b. tomato, c. eggplant, d. nematode infested roots.



affected portions become rotten and finally the plants wilt and die. High soil moisture and formation of crust on the soil surface enhance the attack of the pathogens and death of the plant. Sometimes the attack of bacteria and root knot nematode (RKN) can cause such seedling damage. RKN causes severe galls in the roots.

Vegetable farmers often use various kinds of materials and pesticides in attempts to control these diseases without success. The soil amendment practices that are mentioned here are highly effective as well as cost effective for raising vegetable seedlings and crops without pesticide use.

Sawdust Burning: Firstly, a 3- inch or 6-cm thick layer of sawdust should be spread uniformly over the seedbed. Then the sawdust should be burnt



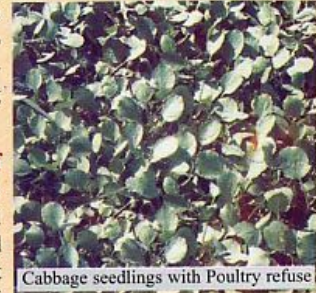
Cabbage seedlings with Sawdust Burning

thoroughly by adding a small amount of kerosene. The high temperature generated through sawdust burning kills most of the nematodes, fungi and bacteria. When the sawdust is completely burnt, the

soil of the seedbed should be thoroughly tilled and prepared for sowing vegetable seeds. Farmers should be careful to clean tools and equipment used in infested fields prior to tillage to avoid re-introducing pathogens.

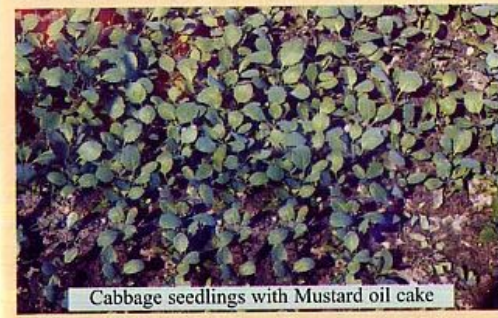
Application of poultry refuse:

Apply well decomposed poultry refuse at the rate of 3-5



Cabbage seedlings with Poultry refuse

tons per ha and mix thoroughly with the seedbed soil. After three weeks, make final preparation of seedbed and sow the seeds after leveling. Note that the poultry refuse must be well decomposed for at least six months; otherwise the seedlings will be damaged. The organic acids that are released in the soil through decomposition of poultry refuse will kill the various soil-inhabiting pathogens and root knot nematodes. Additionally, the organic matter of the poultry refuse improves the fertility of the soil.



Cabbage seedlings with Mustard oil cake

Use of mustard oil cake : Apply powdered mustard oil cake at the rate of 300-500kg per ha. and mix well with the seedbed soil by spading. After three weeks make final preparation of the seedbed, level, and sow seeds. Organic acids that are released from the mustard oil cake will kill the various soil-inhabiting