AVRDC

AVRDC Training Guide

Suggested Cultural Practices for Mungbean

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Introduction

Mungbeans are extensively cultivated in Asia, but their full yield potentials are not being realized. There are several constraints including climatic conditions, adaptation of varieties, disease and insect problems, and poor crop management practices.

The following publication provides information on improved varieties and crop management practices for the production of mungbean. These practices have been developed for Southern Taiwan; growers in other localities should adapt the information to suit their particular conditions.

Selecting a variety

Mungbean is an ancient and well-known crop in Asia. It is often included in rice or wheat-based cropping systems in the tropics and subtropics. The traditional mungbean varieties under cultivation in many countries are often inferior. They are late maturing, require a long harvesting period, low yielding, and susceptible to disease.

AVRDC has developed several superior lines for production in the tropics and subtropics (Fig. 1). These lines mature earlier and more uniformly, produce higher yields, and resist diseases. Early (55-65 days) and uniform maturing mungbeans easily fit into multiple cropping systems. The harvesting cost is reduced, too.

Thailand, Philippines and Indonesia have released early maturing cultivars such as Chainat 60. BPI Mg7 and Merpati, respectively, using AVRDC mungbean lines. AVRDC-improved mungbeans have been named and released directly, or used as parents in breeding programs of different countries. Examples of such varieties are NURI (Indonesia), SML-668 and Pusa Vishal (India), NM-92 (Pakistan), PSU1 (Thailand) and Er Lu No. 2 (China).

Fig. 1. AVRDC's mungbean lines mature early and uniformly, produce high yields, and resist diseases.

Preparing the field

Growing mungbean after rice is best. Avoid planting mungbean after mungbean or cabbages because toxic residues and disease organisms from the previous mungbean or cabbage crops may affect the following mungbean crop adversely.

Prepare the field by plowing, harrowing and leveling (Fig. 2). Application of fertilizer is recom-

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mended based on soil analysis and availability of soil nutrients. In AVRDC fields, a fertilizer mix containing N, P_2O_5 and K_2O at the rate of 15, 60 and 100 kg/ha, respectively is broadcasted and incorporated into the soil before planting. Sidedressing of nitrogen at 15 kg/ha is done at flowering stage.

Prepare raised beds that stand 20 cm high (Fig. 3). Beds should be spaced one meter apart from the center of one bed to the center of the next.

Figs. 2, 3. Preparing beds for planting.

Sowing

Sow seeds on raised beds in two rows per bed, spaced 45 cm apart (Fig. 4). The seed rate varies with seed size and season. It is usually 20 kg/ha in spring and autumn, and 16 kg/ha in summer. The number of plants maintained per meter row length is 20 in spring and autumn, and 15 in summer.

Fig. 4. Sowing seeds in twin rows on raised beds.

Controlling weeds

Herbicides such as alachlor at 1.5 kg a.i./ha in summer and autumn; and chloramben at 2.5 kg a.i./ha in spring are applied as a pre-emergence spray. Handweeding at about 40 days after planting is beneficial (Fig. 5). Practice intertillage by hand or cultivator once or twice to promote healthy growth.

Fig. 5. Handweeding in mungbean field.

Irrigating

Irrigate depending upon weather, soil and field conditions. Usually the first irrigation is required just after seedling emergence. Later apply two to three more irrigations at 10 to 15 day intervals during the dry season. Generally, no irrigation is needed during the rainy season except when drought occurs.

Fig. 6. Furrow irrigation in mungbean field.

Controlling diseases

Mungbean yellow mosaic virus (MYMV) is the most serious problem of mungbean in the Indian subcontinent. Infected plants become chlorotic and stunted (Fig. 7). Planting of MYMV-tolerant/resistant varieties is the best control measure.

Fig. 7. Mungbean yellow mosaic virus symptoms.

Powdery mildew (*Erysiphe polygoni*) occurs under cool temperature (20-26 ºC) and is favored by cloudy weather. It can cause up to 40% yield loss. In the early stage the disease appears as light yellowish irregular spots on leaves which turn brown quickly . A powdery mass grows over the spots covering the entire leaf surface.

To control powdery mildew, sow resistant varieties, if available (Fig. 8). If sowing susceptible varieties, fungicides may be needed to protect the crop. Fungicide applications may begin three weeks after emergence. Consult extension specialists for the proper fungicide and follow all instructions on the label of the product.

Fig. 8. Mungbean lines that are susceptible (left) and resistant (right) to powdery mildew.

Cercospora leaf spot (*Cercospora* spp.) commonly attacks mungbeans in the tropics. Cercospora leaf spot (CLS) is recognized by the appearance of leaf spots that are circular to irregularly shaped with grayish white centers and reddish brown to dark brown margins (Fig. 9). It can cause yield losses of up to 58%.

The losses due to CLS disease can be avoided by planting resistant cultivars. Crop debris and weed hosts should also be removed at the time of planting. When susceptible cultivars are planted, spray with fungicides such as chlorothalonil at 2 kg a.i./ha at two-week intervals.

Fig. 9. Symptoms of Cercospora leaf spot disease.

Controlling insect pests

Beanfly (*Ophiomyia phaseoli*, *O. centrosematis*, *Melanagromyza sojae*, and other species) is the most important insect pest of mungbean. It causes significant damage during the seedling stage. The adult flies are too tiny, only 2 mm, and cannot be recognized easily (Fig. 10). The beanfly maggots feed inside the plant stem and their damage cannot be seed from the outside (Fig. 11).

Mungbeans must be protected against beanflies. At AVRDC, monocrotophos or omethoate or dimethoate is sprayed at 3, 7, 14, 21, 28, and 35 days after emergence. The first three sprays are very important and must not be delayed.

Figs. 10, 11. Tiny adult fly on leaf tip (inset). Close up of beanfly maggot feeding inside stem.

Aphids, especially black legume aphid (*Aphis craccivora*), can attack mungbean (Fig. 12). If you notice unusually high aphid populations (over 20 insects/plant), spray an insecticide such as dimethoate weekly until aphids are eradicated.

Fig. 12. Black legume aphids feeding on stem.

Mungbean is also infested by pod borers (*Maruca testulalis* and *Ostrinia furnacalis*) (Fig. 13). When infestation of pod borers is very severe over large areas of your field, spray chlorpyrifos or fenvalerate at weekly intervals, until the infestation is controlled.

Fig. 13. Maruca pod borer.

Mungbean is sometimes attacked by stink bugs (*Nezara viridula* and other species) (Fig. 14). If you observe unusually high populations of this pest (3–4 insects/meter row) uniformly over an entire field when pods are still green, spray with fenvalerate or deltamethrin at weekly intervals until the infestation stops.

Fig. 13. Stink bug.

Bruchids (*Callosobruchus chinensis* and *C. maculatus*), commonly called pulse beetles or cowpea weevils, attack mungbean both in field and storage. But the greater losses occur in stored grains (Figs. 14, 15). The nutritional quality of the grains deteriorates because of bruchid infestation rendering them unmarketable.

To control bruchids, clean storage area properly, dry seeds well, and apply non-toxic chemicals such as vegetable oils. For large-scale storage, fumigation with phosphine or other suitable fumigants can be adopted. Always follow the label directions when using any pesticide.

Figs. 14, 15. Bruchids feeding on mungbean grains.

Harvesting

Harvest when pods are mature and dry, but before they start shattering (Fig. 16). Manual harvesting is usually practiced (Fig. 17), but mechanical harvesting (Fig. 18) can save on labor costs. Defoliation of the plants is needed before mechanical harvesting. Ethrel, at 39.5% a.i. and 500 times dilution, will defoliate 90% of foliage without harming seed quality. ⌘

Fig. 16. Shattering pods.

Figs. 17, 18. Manual and mechanical harvesting.