Soybean

Mirza Hasanuzzaman, PhD
Assistant Professor
Department of Agronomy, Faculty of Agriculture
Sher-e-Bangla Agricultural University

Introduction

Soybean (*Glycine max* L.) belongs to Fabaceae family native to East Asia, widely grown for its edible bean which has numerous uses. The plant is classed as an oilseed rather than a pulse by the UN Food and Agricultural Organization (FAO). Soybean contains 40-45% protein and 19-22% oil.

Area and production

Worldwide the total annual production of soybean is 260.91 million tons from an area of 102.99 million hectares (FAO, 2013). The main producers of soybeans are the United States (35%), Brazil (27%), Argentina (19%), China (6%) and India (4%). In Bangladesh soybean is cultivated mainly as pulse crops. In Bangladesh, the total cultivated area under soybean cultivation is 41440 hectares which produces 65883 tonnes of oil per year (FAO, 2013). The yield of soybean is 1.59 t ha^{-1} which is much lower than the world average (2.53 t ha^{-1}).

Climates and soil

This crop can grow almost anywhere with a warm growing season, ample water, and sunlight. Soil and air temperatures of 13–16°C are necessary for germination and seedling growth of soybean, but further increases in temperature up to about 32°C are better. Loam, sandy loam of clay loam soil are suitable for soybean cultivation. During rainy season land should be high and well-drained. In rabi season soybean may be cultivated in medium low land.

Varieties

Brag, Davis, Shohag (PB-1), Bangladesh Soybean-4 (G-2), BARI soybean-5, BARI soybean-6

Production Technology

Land preparation

Depending on soil types 4-5 plowing followed by laddering is required for the land preparation.

Sowing time

Soybean can be cultivated both in rabi and kharif season. In rabi season seed should be sown between mid-December and mid-January, while in kharif season mid-July to mid-August is the optimum time of sowing.

Sowing methods

Line planting is recommended for soybean cultivation. In some cases, broadcasting methods are also practiced. In case of line sowing, row to row distance is 30 cm in rabi season and 40 cm in kharif season. Seeds should be placed in 3-4 cm depth giving 4-5 cm distance from plant to plant. After sowing seeds should be covered by loose soil.

Seed rate

Seed rate depends on germination of seeds and moisture content of soil. The seed rate of soybean varies from 35 to 75 kg ha^{-1}.

Fertilizer rate and application method

The recommended doses of fertilizers are as follows:

Name of fertilizers	Dose (kg ha^{-1})
Urea	50−60
Triple superphosphate (TSP)	150−175
Muriate of potash (MP)	100−120
Gypsum	80−115
Boric acid	8−10

In addition, cowdung or compost @ 20 t ha^{-1} may be applied for higher yield. All the manures and fertilizers should be applied during final land preparation. Inoculum of *Rhizobium* may be used @ 65-75 g kg^{-1} seeds as biofertilizer. In that case no urea is required.

Intercultural operations

Irrigation

In rabi season, depending on soil type and availability of moisture 2-3 irrigations may be required. During flower initiation and pod formation stage irrigation is necessary. If there is no rain then first irrigation should be applied at 25-30 days after emergence and second irrigation should be applied at 50-55 days after emergence. After irrigation, mulching should be done by *nirani* for preserving soil moisture for longer period. In kharif season irrigation is needed. But during pod filling stage in the month of October one irrigation may be required. Sometimes excess rain water needs to be drained out by making appropriate drains.

Weeding

Weeding may be done 20-25 days after emergence.

Thinning

If plants are densely populated thinning should be done. In rabi season 50-60 and in kharif season 40-50 plants should be kept.

Pest management

Hairy caterpillar and leaf roller is the main insect of soybean. It can be controlling by spraying Sumithion 57 EC or Sevin 20 EC @ 2 ml L^{-1}. Spraying should be done 2 times at 10 days interval. Among the diseases, yellow mosaic virus is the most harmful for soybean which can be prevented by controlling aphids.

Harvesting

Soybean crop needs 90 to 120 days to mature. During maturity plants turn yellow in color and leaves senescence occur. After harvesting plants are dried in the sun for 2-3 days and then threshed by beating with a wooden stick; and seeds are separated and cleaned. Cleaned seeds should be dried properly and stored. Soybean yield varies from 1500-2000 kg ha^{-1} depending on variety and season.

In Bangladesh the difficulties of oil extraction if the main constraints of cultivating soybean as oil crop and hence it is often termed as pulse crop.

Suggested Readings:

Singh, Guriqbal (2010) The Soybean: Botany, Production and Uses. CAB International, Oxfordshire, UK.
Johnson, Lawrence A.; White, Pamela J. and Galloway, Richard (2008) Soybeans: Chemistry, Production, Processing, and Utilization. AOCS Press, Illions, USA.
BARI (2001) Production Technology of Oilcrops. Oilseed Research Centre, Bangladesh Agricultural Research Institute, Gazipur, Bangladesh
বারি (২০১১) কৃষি প্রযুক্তি হাতবই (খন্ড-১) । বাংলাদেশ কৃষি গবেষণা ইসস্টিটিউট, জয়দেবপুর, গাজীপুর।

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