

Harvesting soybean

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High soybean yields and quality require the harmony of all production factors. Timely and efficient soybean harvest is one of the key challenges. Inappropriate harvesting can lead to harvest losses of up to 30%. The main factors that impact harvest losses are pre-harvest activities (seedbed preparation, crop canopy), harvest time and combine harvester settings.

Outcome

Successful soybean harvesting is about recovering the highest proportion of the grain with the best possible quality and purity at the optimal time.

Harvest time

Harvest should start when the seed moisture drops to 13–15%. The rate of drying primarily

Applicability

Theme: Cultivation practices

For: All soybean growers

Where: Where soybean is planted

Timing: August - October

Equipment: Harvester

Follow-up: Drying, processing, storage

Impact: Yield quantity and grain quality

depends on temperature and precipitation. The moisture content in the seeds can differ within a day by 5%. If the seeds are too damp in the morning, they can dry during the day. The moist phase persists longer as the nights become longer and colder. Wind accelerates drying. If after mid-October the seed moisture content is higher and no better weather in



Combine harvester. Photograph: IFVCNS



sight, it is also possible to start harvest up to 20% moisture, but then drying is required which involves additional costs. Losses increase and seed quality is reduced with delayed harvest.



Mature pods. Photograph: IFVCNS

The following situations can prevail:

- The crop has developed under favourable conditions, leaves fall down during maturation and, within a few days, seed moisture drops to the optimal level for harvest.
- The plants are exposed to stressful conditions such as drought and/or high temperature leading to early senescence. Most of the leaves remain on the plants, while the pods and seeds are mature and ready for harvest.
- The crop is mature and not harvested on time. Losses increase due to diseases and pod shattering. This especially occurs if the pods are exposed to several cycles of wetting and drying.

During growing season, crop development can vary depending on field conditions. It is recommended that farmers check pod maturation and grain moisture regularly to determine the start of harvest. Sometimes it is necessary to adjust the harvester twice a day because seed moisture may fluctuate depending on the time

of the day (seed moisture may differ at dawn and dusk by up to 5% from seed moisture at noon).

Principles

Careful adjustment of the combine harvester is essential for a successful harvest. Soybeans have several characteristics that determine the optimum harvest practices. First, the earliest pods often form close to the ground, which means that the combine table and knife have to be guided close to the ground. A level, firm, and stone-free seedbed is a great help. The crop itself affects drying rates. A mature soybean stand is more open than a cereal stand and can dry rapidly during the day. As the pods are fragile, repeated cycles of drying and wetting increase pod shattering and loss of seeds. Timing is therefore critical if the weather is unsettled.

The ideal grain moisture content is about 13%. For seed production it is about 15% because seeds at this moisture content are less vulnerable to mechanical damage. Waiting until the crop has dried down to about 12% reduces the cost of drying after harvest. The seed moisture content must be below 15% for short term storage and about 12% for long term storage.



Soybean ready for harvest. Photograph: IFVCNS

The characteristics of the soybean itself influence the combine setting and operation. Soybeans are large and heavy but the seed coat is fragile. The grains need to be protected from the threshing forces and mechanisms, especially if the grain is used for seed production. The first protection mechanism is the crop itself. Keeping the combine

well-filled with crop material protects the seed. This means ensuring the combine forward speed is high enough to prevent an empty or nearly empty threshing mechanism. Very dry seed is fragile, so the second protection mechanism is harvesting before the seed becomes too dry. Harvesting soy with a seed moisture content below 12% increases the rate of damaged beans. 15% is an optimum for seed crops.

The third mechanism is adjustment of the drum speed and related concave clearance. The pods are easily threshed and so a very gentle threshing mechanism can be used with a low drum speed and open concave. This also reduces fuel consumption of the combine. A high fan speed can be used to gently separate the seed from the straw. Lastly, the seed should be handled gently in the grain tank, in the augers and during transport by not emptying tanks and augers completely and by minimising auger speeds and drop heights.

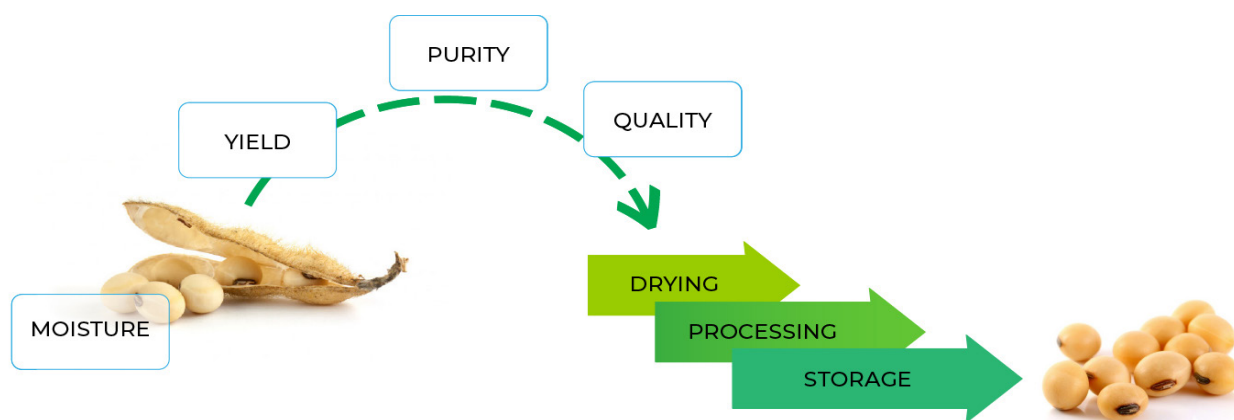
Key practice points

- Harvest should be adjusted to the field and crop conditions. This involves appropriate adjustments of the harvester forward speed, airflow, drum speed, concave clearance, and sieves.
- The crop bulk protects the seed so the forward speed should be maintained for sufficient material flow through the threshing mechanisms to reduce damage to the seeds.



Pouring soybean grain onto a tractor trailer. Photograph: IFVCNS

- The cutter bar should be kept close to the ground (3–6 cm). To allow cutting close to the soil surface, forward speed should be kept moderate at no more than 5 km/h. Stones or an uneven surface can limit the lowest possible cutting height as damage through stones or contamination with soil should be avoided.
- Ideally, a flexible cutter bar should be used that allows gliding on the ground and removal of stones and such, reducing losses by about 10% to a minimum.
- The header reel should be carefully adjusted to reduce contact with the crop. Reel speed revolutions should be synchronised with the harvester speed – usually 25% faster.
- Drum speed should be kept to 400–600 rotations per minute, depending on seed moisture.
- The sieves should be adjusted according to the seed size.



Soybean harvest focal points

Further information

Video: <https://youtu.be/ojoqDzMNQGo>

Taifun Soy Info 13: Threshing soybeans correctly

Taifun Soy Info 14: Flex cutting bars

Sources

Information shared in this practice note results from the trials and studies carried out by Institute of Field and Vegetable Crops in Novi Sad, Serbia.

Miladinović, J., Hristić, M. and Vidić, M., 2011. Soybean. Institute of Field and Vegetable Crops, Novi Sad. pp. 307–311.

Balešević-Tubić, S. and Miladinović, J., 2014. Semearstvo soje [Soybean Seed Production]. Institute of Field and Vegetable Crops, Novi Sad. pp. 89–91.

Đorđević, V., Malidža, G., Vidić, M., Milovac, Ž. and Šeremešić, S., 2015. Priručnik za gajenje soje [Manual for Soybean Growers], Danube Soya, Novi Sad. pp. 64.

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