BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg
BG PULSE JOURNAL

REQUIREMENTS FOR THE SUITABILITY OF CHICKPEAS FOR MECHANIZED HARVESTING

J. T. Naxalbaev
PhD in Agricultural Sciences, Senior Researcher;
M. Narbayeva
Doctoral Researcher
Lalmikor Agricultural Research Institute[1]
https://doi.org/10.5281/zenodo.20422690

Abstract

This article presents information on the biological and morphological characteristics of pea crops, the main requirements for harvesting using mechanization: sufficient plant height, high location of pods, uniform ripening, resistance to shedding, resistance to lodging, pea harvesting technology, the importance of agrotechnical measures, and the economic efficiency of mechanization.

Keywords:

Introduction

Legumes are of great importance in agriculture. Among them, pea (Cicer arietinum L.) stands out for its role in ensuring food security, use as a source of protein, and increasing soil fertility [1]. In recent years, the expansion of pea cultivation areas has required the development of mechanized harvesting technologies [2].

The efficiency of mechanized harvesting of pea crops is directly related to the biological and morphological characteristics of the plant. The creation of varieties suitable for mechanization, the correct organization of agrotechnical measures, and the use of modern combines increase productivity and reduce crop losses [3].

Biological and morphological characteristics of pea crops

Pea is an annual legume, which is distinguished from other legumes by its drought resistance and low water requirements [4]. The plant height is usually in the range of 30–80 cm. The stem can be erect, semi-erect, or prostrate.

The following morphological characteristics are important for mechanized harvesting:

- upright growth of the stem;
- higher location of the pods;
- simultaneous ripening;
- resistance of the pods to shedding;
- stem strength [5].

In low-growing and prostrate varieties, a large part of the crop is lost during harvesting with a combine. Therefore, special attention is paid to creating varieties suitable for mechanization in breeding work [6].

Main requirements for mechanized harvesting

There are agrobiological and technical requirements for mechanized harvesting of peas.

Sufficient plant height

The combine harvester's cutting device operates at a certain height above the ground. Therefore, it is recommended that the plant be at least 45–50 cm tall [2]. In low-growing plants, some of the pods remain uncut.

High location of pods

The height of the lower pods above the ground should not be less than 12–15 cm [3]. This ensures that the combine harvester's cutting device completely covers the crop.

Uniform Ripening

The uniform ripening of peas is an important factor for mechanized harvesting. If the plants ripen unevenly, some pods will remain green while others will dry out and fall off [4].

Resistance to lodging

The cracking of pods due to mechanical impact leads to yield loss. In varieties suitable for mechanization, the pod skin should be strong [5].

Resistance to lodging

Crops that lie down due to rain and wind become difficult to harvest with a combine. Therefore, stem strength is an important indicator [1].

Pea harvesting technology

There are two main methods used to harvest peas:

1. Direct harvesting;

2. Two-phase harvesting [6].

Harvesting with a combine

In this method, peas are harvested in one go using a combine when they are fully ripe. This method:

- **saves time;**
- **reduces labor costs;**
- **is economically efficient [7].**

However, if the humidity is high or the crop is unevenly ripe, yield losses may increase.

Two-phase harvesting

In this method, the plant is first cut and laid in rows, and then harvested with a combine when it dries [5]. This technology:

- **is effective in unevenly ripe fields;**
- **in humid climates;**
- **in dormant crops.**

Technical requirements for combines

Combines adapted for harvesting peas should have the following technical characteristics:

- **low cutting height;**
- **elastic cutting device;**
- **no crushing of grain;**
- **the ability to control the drum rotation speed [2].**

To reduce grain damage, it is recommended that the drum rotation speed be in the range of 400–600 rpm [3].

In order to reduce crop loss:

- **the platform height is correctly adjusted;**
- **the combine speed is regulated;**
- **the grain moisture is controlled** [4].

Importance of Agrotechnical Measures

The efficiency of mechanization depends on the proper organization of agrotechnical practices.

Seeding Rates

Densely planted chickpeas are more prone to lodging. The optimal seeding rate is considered to be 0.6–0.8 million seeds per hectare [1].

Fertilization

Phosphorus and potassium fertilizers:

- strengthen the stem;
- increase yield;
- accelerate ripening [6].

Irrigation Regime

Excessive irrigation stimulates vegetative growth and causes lodging. This reduces the efficiency of mechanized harvesting [7].

Main Causes of Yield Losses

During mechanized harvesting, yield losses are associated with the following factors:

- low pod placement;
- improper combine harvester adjustment;
- high grain moisture content;
- uneven ripening;
- wind and precipitation [5].

According to research, yield losses under improperly organized harvesting may reach up to 15–20% [3].

Economic Efficiency of Mechanization

Mechanized chickpea harvesting:

- increases labor productivity by 3–4 times;
- reduces fuel consumption;
- enables harvesting of large areas within a short period [2].

In addition:

- crop quality improves;
- human labor becomes easier;

Conclusion

The biological and morphological characteristics of chickpeas are of great importance for efficient mechanized harvesting. Selecting varieties suitable for mechanization, properly organizing agrotechnical measures, and using modern combine harvesters reduce yield losses and increase economic efficiency [6].

In the future, developing varieties with:

- high placement of lower pods;
- resistance to lodging;
- uniform ripening

will remain an important task [7].

References:

1. Ўзбекистон Республикаси Қишлоқ хўжалиги вазирлиги. “Дуккакли экинлар етиштириш технологияси”. Тошкент, 2021.
2. Amonov A., Xoliqov B. “Dukkakli don ekinlarini yetishtirish va yig‘ishtirish texnologiyasi”. Toshkent, 2020.
3. FAO – Chickpea cultivation guide
4. ICRISAT – Chickpea production manual
5. Singh K.B., Saxena M.C. “Chickpeas”. CAB International Publishing, 1999.
6. ResearchGate ilmiy maqolalar bazasi
7. Yormatova D. “Qishloq xo‘jaligini mexanizatsiyalash asoslari”. Toshkent, 2018.

BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg