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Characteristics of glycine max trees in Vietnam

Nguyen Kieu Linh
Tan Trao University, Tuyen Quang, Vietnam

* Corresponding Author: **Nguyen Kieu Linh**

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Abstract
Glycine max is one of the important crops not only in Vietnam but also in many countries around the world. This article explores the characteristics of glycine max in order to develop this crop so that it is economically and nutritionally meaningful. At the same time, glycine max also play an important role in improving fertility and sustainable use of land resources.

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1. Introduction

Glycine max is one of the crops that humans have known how to use and cultivate for a long time, so the origin of the glycine max plant was soon verified. Historical, geographical and archaeological evidence all confirm that glycine max originated in Asia and originated in China. Glycine max were domesticated in China through many pre-feudal dynasties and brought into cultivation. Glycine max belong to the genus *Glycine*, family *Leguminos*, subfamily *Papilionnoideae* and order Phaseoleae. It is the most important plant in the legume family *(Fabaceae*). Glycine max, also known as glycine max, is a short-term dry crop with high economic value. The glycine max plant has many uses, its products are used as food for humans, feed for livestock, raw materials for agriculture, and export goods. That's why Glycine max are called " the king of legumes".

To have such a position is because Glycine max have superior characteristics compared to other bean varieties, which are: High protein and lipid content: protein from 32% to 52%, lipid from 12% to 25%, glucid (10-15%), contains many vitamins..., is an important source of energy for humans and pets. Glycine max have high nutritional content, the average protein content is about 35.5-40%, while the protein content in rice is only 6.2-12%, corn 9.8-13.2%, beef 21%. %, chicken 20%, fish 17-20% and eggs 13-14.8%. Lipids from 15-20%. Carbohydrates from 15-16%, many vitamins and mineral salts important for life. Glycine max seeds are the only food whose value is assessed simultaneously for both protit and lipid. Glycine max protein has the best quality among proteins of plant origin [1].

The content of sulfur-containing amino acids such as methionine and sisterin in glycine max is almost as high as the content of these substances in chicken eggs. Glycine max have a balance of essential amino acids. Protein is easier to digest than meat and does not contain cholesterol-forming components. Glycine max contain lecithin, which helps keep the body youthful, increases memory, regenerates tissues, hardens bones and increases the body's resistance. Glycine max seeds contain higher fatty oil content than other beans, so they are considered an important source of vegetable oil. Glycine max lipids contain a high proportion, aromatic flavors such as lioleic acid accounting for 52-65%, oleic acid 25-36%, and linolenolic acid about 2-3%. Especially in sprouting glycine max seeds, the vitamin content increases a lot, especially vitamin C in addition to other ingredients such as vitamin PP and many other minerals such as Ca, P, Fe.

In Vietnam, glycine max have been grown for a long time, earliest in the midland and mountainous provinces of the North and the Southeast. Currently, glycine max varieties being grown in Vietnam have two origins, which are a group of local varieties and imported varieties [2, 8].

2. Contents

2.1. Biological characteristics of glycine max plants

The glycine max stem is herbaceous, round in shape, with many small hairs on the stem. When young, the stem is green or purple, when old it turns light brown. The color of the stem when young is closely related to the color of the flowers later. If the stem is green when young, the flowers are white, and if the stem is purple when young, the flowers are reddish purple.

The average stem has 14-15 internodes, the internodes at the bottom are usually short, the internodes at the top are usually long (Because the internodes above develop from day 35-40 onwards when the plant is growing rapidly, the internodes are often long). Depending on the variety and sowing time, the internode length varies, usually ranging from 3-10 cm. Summer glycine max plants have longer internodes than spring and winter crops. The length of the internode contributes to determining the height of the stem. glycine max stems are usually 0.3-1.0m tall. Wild glycine max varieties are 2-3m tall. In fact, there are also breeds that do not have fluff. Varieties with thick, dark-colored fluff are disease-resistant, drought-resistant and cold-resistant. Varieties without fluff often grow abnormally and have poor resistance. Having more or less hair on the body, long or short, thick or sparse is a characteristic that distinguishes different varieties. Based on the growth and characteristics of the body, people are divided into 4 types.

- Straight growing type: hard stem, large stem diameter, not very tall stem, short nodes, many concentrated fruits are usually limited flowering varieties.
- Bovine type: main stem with very small, soft branches, covering the ground surface in a bunch of strings, very long stem, long segments, small scattered fruits.
- Half-cow type: is an intermediate type between the two types that grow straight and grow like cows.
- Climbing type: very long small stem, grows underground or climbs on other substrates glycine max stems have the ability to branch right from single or double leaf axils. Based on the growth of stems and branches and flowering characteristics, glycine max varieties are divided into two types.
- Limited growth: When the top of the stem or branch has flowered, it will not continue to grow or the branch will not grow taller, this type is often grown for seeds.
- Infinite growth: When Glycine max flower and bear fruit and even when they are about to ripen, the stems continue to grow, usually creeping.

From the time it grows until the plant has 5 true leaves (3 compound leaves), about 25 - 30 days after sowing, the stem grows at a normal speed.

When the plant has 6-7 true leaves (4-5 compound leaves), the stem begins to grow strongly. The difference between the glycine max plant and other crops is that when the plant blooms, it is when the stems and branches develop the most. This is the second stage of the growth and vegetative process, so it is necessary to provide adequate nutrition before entering this period and create favorable conditions for the root system to develop.

Glycine max plants have 3 types of leaves

- Cotyledons (tetraphylla leaves): newly grown cotyledons are yellow or green and turn green when exposed to light. If the seed is large, the cotyledons contain a lot of nutrients to grow the sprouts. When the nutrients run out, the cotyledons wither.
- Whole leaves (simple leaves): appear 2-3 days after growth and grow above the cotyledons. Single leaves grow symmetrically, large shiny green single leaves are a sign of good plant growth, large dark green single leaves represent a variety that is resistant to cold, wavy pointed single leaves are a sign of abnormal plant growth. often.
- Compound leaves: Each compound leaf has 3 leaflets, sometimes 4-5 leaflets. Compound leaves grow alternately, are bright green, and turn yellow-brown when old. There are also varieties that when the fruit is ripe, the leaves still retain their green color. Most of the leaves are hairy. Leaves come in many different shapes depending on the variety. Small and long leaf varieties are drought tolerant but often have low yields, large leaf varieties are less drought tolerant but often have higher yields. If the first two compound leaves are large and thick, it often shows that the variety is resistant to cold. The number of compound leaves is more or less, the leaf area is large or small, which greatly affects the yield and depends on the planting season. The leaves in any inflorescence play the main role in providing nutrition for that inflorescence.

Glycine max roots consist of a taproot and many taproots. The taproot goes 20-30cm deep, but at a depth of 7-8cm the taproot is only as big as the baby roots. Rootlets are concentrated at a depth of 6-20cm and grow abundantly. Roots grow strongly in both width and depth, later roots grow horizontally. At a depth of 2-3cm, when encountering the roots of a nearby tree, it turns to penetrate deeper into the ground.

Glycine max roots are different from grass roots in that they have main roots and secondary roots, the main roots can be 30-50 cm deep and can be over 1 meter deep. On the main root, many secondary roots grow. Secondary and tertiary secondary roots are concentrated in the 7-8cm soil layer, 30-40 cm ^{2} wide. There are many nodules on the main and secondary roots. The root system is distributed deep, wide and narrow, the number of nodules is more or less depending on the variety, soil, climate and planting techniques. The development process of the root system can be divided into two periods.

- **First period:** First root development, this period the first taproot and secondary roots grow strongly, elongate and produce many rootlets, this period usually lasts 30-40 days after sprouting.
- **Second period:** The first layer of roots grows slowly, baby roots do not sprout anymore, some roots even dry out. At this time, the base of the stem near the root collar has small secondary roots that extend and grow until near harvest. There can be 30-40 secondary roots that feed near the ground. This layer of roots is responsible for providing adequate nutrients for the growth of stems, leaves and fruit.

On the roots of glycine max plants, there are many nodules, which are small tumors attached to the roots. Nodules are the result of symbiosis between some microorganisms with the scientific name *Rhizobium Japonicum* with glycine max roots. In a nodule there are about 3-4 billion microorganisms that can only be seen through a microscope. Microorganisms are usually rod-shaped or spherical.

- Nodule characteristics: glycine max root nodules are usually concentrated in the soil layer from 0-20cm, the nodules become fewer and deeper, there are few or no nodules. Nodules play a key role in the nitrogen fixation process, providing plants with a large amount of nitrogen, about 30-60kg/ha. The nodules can be 1cm long, 5-6mm in diameter, newly formed and have a milky white color, at best they are pink (globulin color has a structure similar to hemoglobin in blood containing Fe).
- Nodule formation process: There are always many types of microorganisms in the soil, often concentrated around the roots. On the other hand, around the roots due to cultivation, soil conditions are favorable for microorganisms to grow. Legumes secrete substances such as glucose, galactose that attract microorganisms, including nodule microorganisms, to the roots of legumes. When nodules develop to a certain stage, they fix nitrogen. The nodules themselves absorb N and the microorganisms act as catalysts. When they get old, the microorganisms go out. The process of forming nodules lasts 16-21 days, developing most strongly when Glycine max flower and produce fruit.

The relationship between nodule microorganisms and glycine max plants is a symbiotic relationship, the plant provides nutrients for the bacteria to function, and the bacteria, in turn, integrate free nitrogen from the air and convert it to plant organic nitrogen. can be used. The more nutrients a glycine max plant has for microorganisms to function, the more the microorganisms will grow and the more nitrogen they will accumulate for the plant to grow and develop well.

Glycine max are self-pollinating plants. Glycine max have flowers growing from the leaf axils, small flowers, not fragrant, white, purple or light purple flowers. The shape of the glycine max fruit is straight or slightly curved, the outside of the fruit is rough and hairy, and when ripe, it is yellow or gray. Seeds are round, flat, oval... the outer surface has only a thin shell surrounding a large embryo. The seed shell is smooth and the seed color is mostly yellow [2].

2.2. Ecological characteristics of glycine max plants

Suitable temperature The germination stage and seedling stage are from 24 - 30 ^{0}C, the humidity at the germination stage is about 75 - 80% but at the young seedling stage the humidity drops to 50 - 60%. Temperature 24 -34 ^{0}C is the appropriate temperature for the flowering and fruiting stage. At this stage, the need for moisture increases almost like the germination stage from 70 -80%, to the ripe fruit stage the appropriate temperature The temperature drops to 20 - 25 ^{0}C and the humidity also drops sharply to 35 - 45%. In Glycine max, the rainfall needs to reach 700 mm, which is best. Most glycine max varieties can be grown on many different types of soil such as alluvial soil, gray soil, sandy soil, these soils often have light mechanical composition, pH level from 5-8 [8].

Conclude

Economic value of glycine max in industry: is a raw material for various industries such as artificial rubber processing, paint, printing ink, soap, plastics, rayon, heating agent, internal lubricating oil. aviation industry but mainly used for oil pressing. Currently, Glycine max are the leading crop in the world providing raw materials for oil pressing, glycine max oil accounts for 50% of total vegetable oil. The characteristics of glycine max oil are that it dries slowly, has a high iodine index, and condenses at -15 to 18 ^{0}C. From the oil, people make hundreds of other industrial products such as making candles, soap, etc.

Economic value of Glycine max in agriculture

- As animal feed: Glycine max are a good source of food for livestock. 1kg of glycine max seeds is equivalent to 1.38 units of animal feed. The entire glycine max plant (stems, leaves, seeds) has a fairly high protein content, so by-products such as fresh stems and leaves can be good animal feed because it has a fairly high nutritional content such as N: 6,2%, P_2O_5: 0.7%, K_2O: 2.4%.
- Soil improvement: Glycine max are good soil improvement rotation crops. If 1 hectare of Glycine max grows well, it leaves 30-60kg of N in the soil. If Glycine max are arranged in a reasonable crop structure, it will have an impact. Good use for later crops, contributing to increasing productivity of the entire crop system and reducing costs for N fertilization glycine max leaf stems are very good for field fertilizer or organic fertilizer because the N content in the stem accounts for 0.05 %, in leaves accounts for 0.19%.

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