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THE NATURE OF INHERITANCE OF LEAF THICKNESS, TYPE AND NUMBER OF HAIRS IN COTTON

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MONOGRAPH

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Annotation

The monograph is devoted to the Hawaiian wild polyploid cotton species *G. tomentosum Nutt. Former It seems* . and *G. hirsutum L.* species were isolated as a result of individual selection from interspecific hybrids and cultivated species of *G. hirsutum L.* and hybrids obtained on the basis of hybridization with the analyzer sequence. number, nature of heredity of leaf thickness. The plate and the study of its formation over generations are described on the basis of collected scientific materials.

The monograph is recommended as an additional source for teachers, graduate students and researchers engaged in scientific activities related to genetics and breeding.

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TABLE OF CONTENTS

INTRODUCTION

Our republic is one of the world's leading producers of raw cotton. Currently, the main attention in cotton growing is focused on creating new varieties of cotton that are naturally resistant to various stress factors, productive, with high fiber quality and beneficial for human health. The negative impact of pests on global agriculture is estimated at $1.4 trillion, representing 5% of global gross domestic product. Therefore, when breeding new varieties of cotton, one of the urgent tasks is the creation of new source materials based on the identification of donors with unique characteristics and properties, including those resistant to sucking pests (spider mites), as well as further improvement of valuable cotton varieties. economic characters.

In order to increase export volumes and income in the cotton textile sector through the introduction of a new system for increasing cotton yields, sowing, variety selection, tillage, fertilization and irrigation, based on science and innovation in cotton cultivation, on July 7, 2022, the President of the Republic of Uzbekistan " Cotton" adopted "On additional organizational measures to increase productivity, introduce science and innovation in cotton cultivation."

Based on natural necessity and demand, modern geneticists and breeders pay special attention to this area in their scientific research.

As a result of natural climate changes occurring in our region, the impact of various diseases and pests is increasing. World experience shows that breeding work carried out without taking into account the natural resistance of the plant ultimately leads to the genetic susceptibility of the new variety to harmful organisms. The spread of such varieties over large areas causes epiphytoty (large-scale reproduction) of the pest. There are agrotechnical, genetic, environmental and other methods of pest control. Among the control methods, the most effective and productive is the search for donors (genotypes) with natural resistance factors and the creation of varieties using them. Of course, this process takes a long time, but the costs of pest control and environmental pollution with various chemical compounds will be reduced - there will be an environmentally friendly environment. During the production and use of pesticides used to control pests, many of them are released into the atmosphere, which is also dangerous to human life, animals and plants.

The most effective and convenient way to protect crops from pests is to search for pest-resistant varieties. As mentioned above, this method dramatically reduces the use of pesticides, saves money spent on the production of various chemicals, and also protects the environment from pollution by chemicals and their derivatives.

A wild polyploid cotton species native to the Hawaiian Islands *is G. tomentosum Nutt. Former It seems* . It is distinguished by its unique features. It has a number of features important for breeding and genetic research. Among them, the high quality of fiber of this type, the presence of a complex hair coat that prevents damage by sucking pests (in particular, spider mites), and resistance to wilting and drought are of great importance when solving scientific research work. aimed at solving pressing problems of our time.

G. tomentosum Nutt. Former It seems . breeders and geneticists are interested in the uniqueness of the species. As a result of previous studies, hybrids of this species with specimens of *G. hirsutum L. have been studied to some extent.* However, genetic analysis of the heredity and intergenerational variability of the beneficial properties of this wild species has not been carried out. This is of great importance when studying the nature of these positive traits, when assessing the possibility of their preservation over generations.

In this monograph, the wild polyploid cotton species native to the Hawaiian Islands *is G. tomentosum Nutt. Former It seems* . and *G. hirsutum L. hybridization between interspecific hybrids and species of G. hirsutum L.* isolated from interspecific hybrids, and hybridization between species of G. hirsutum L., the thickness of the cotton leaf blade, the type of hairs and the number of hairs on the leaf, which ensures tolerance to pests in offspring. Based on scientific data, the nature of heredity of such traits and a genetic analysis of their variability are described.

CHAPTER I. THE IMPORTANCE OF COTTON AND THE ISSUE OF PESTS

1.1. The importance of cotton in the national economy

Cotton is a widely grown crop in our country. Its products are used in many industries. But this plant is grown mainly to obtain valuable material for the textile industry. Unlike other crops, cotton produces three valuable products in one direction: raw material for textile products - fiber, oil for food products, animal feed - kunjara and husk. Cotton is grown primarily for its fiber. On average, 320-340 kg of fiber and 560-580 kg of seeds are obtained from 1 ton of raw cotton. From 340 kg of fiber, in turn, 3500-4000 m of gasmol is obtained, and from 580 kg of seeds, 112 kg of oil, 10 kg of soap, 270 kg of kunjar, 170 kg of husk and 8 kg of lint (fluff).

Cotton fiber differs from artificial fibers in that high-quality textile and technical products (items) are obtained from it and belongs to the group of natural fibers, which are universal raw materials. 34-35% fiber, 60-62% seeds, 2-2.5% fluff (lint) and 1.0-1.5% waste are extracted from seed cotton in cotton gins. Cotton accounts for more than 50-60% of global textile fiber production. Cotton fiber is mainly used to make yarn, textiles, clothing and hygroscopic cotton. It is widely used in aviation, automobile, electrical and other industries. Fiber is used to make many products, such as parachutes, strong ropes, ropes, hoses, belts, film and writing paper.

The seeds contain 20-28% oil; cottonseed oil is obtained by pressing and extraction. Cottonseed oil is widely used in food.

Cottonseed oil is used in the production of glycerin, stearin, alif, varnish, enamel and other products. The seeds contain the pigment gossypol (a toxic organic compound), which is released during the oil extraction process and is used to produce various synthetic substances. Soap is made from waste from the oil industry. Once the oil is extracted, the remaining oil is used as animal feed and fertilizer.

In addition to seed husks (husks) and grain for livestock feed, the industry produces potash, bleaches, alcohol, paper, cardboard and many other products. Phytin and dietary protein are even extracted from cottonseed meal.

More than 100 compounds can be extracted from cotton plant stems. 20 different organic acids are extracted from the leaves, including valuable malic and citric acids. Vitamins, stimulants, amino acids, and microelements were also found in waste from cotton gin plants.

Significantly widespread use of plastered stems and pods as a building material, in addition to fuel. It is used to make pressed plywood, wood and the necessary materials for making furniture. Paper, cardboard, and cellulose are also taken. The crushed stems can also be used as fertilizer and animal feed by mixing them with feed through fermentation.

The cotton flower stores a lot of nectar. Therefore, it is considered a convenient honey storage for bees. From the fiber, seeds and other parts of cotton, a valuable crop, 200-250 types of consumer goods and technical products are obtained.

1.2. Cotton pests

Spider mite *(Tetranychus urticde Koch.)* **.** One of the most dangerous pests of cotton is the spider mite. The pest sometimes causes the death of half the crop grown in cotton fields. As a result of spider mite damage, cotton yields are significantly reduced every year.

The spider mite is an omnivorous pest that feeds on 248 plant species, especially cotton, soybeans, peanuts, mung beans, sesame and sometimes corn, as well as mulberries, grapes, fruit and ornamental trees.

Spider mites are very small pests that are difficult to see with the naked eye. When viewed through a magnifying glass, the body is oval in shape, measuring 0.4-0.65 mm. Spider mites are yellowish-green in summer, reddish in early spring, and red in late autumn . Mated female spider mites hibernate at the end of September. At this time, the spider mite turns red and stops feeding. The spider mite overwinters mainly where it is most developed in the fall, including in the stem and its remains, in the ground . It overwinters under large cuttings, in the bark and heads of mulberry trees from field banks, under trees, in the remains of broad-leaved grass along the banks of roads and ditches. The wintering caterpillar is very cold-resistant, and at a temperature of -20 ^{0}C in warm areas even one or two seeds die. This pest emerges from winter very early, in March, when the average daily air temperature exceeds 12-13 ^{0} $^{C.}$

Spider mites are usually spread through threads that they create with the help of wind, running water, work clothes and people's work tools. Therefore, cotton and other crops are primarily affected in the peripheral areas of the field. Dust falls on the leaves of cotton sprouts in fields and roadsides, sticks to the web, protects it from predatory insects and provides an opportunity for its reproduction. Warm weather also creates favorable conditions for the development and spread of spider mites.

In fields sown with cotton, spider mites begin by damaging the leaves of the first 1-2 cotton plants. The greatest damage and spread of cotton seedlings by this pest occurs in mid-summer. Because during this period the sprouts grow, and the leaves connect with each other, creating a “bridge” for the spider mite to move from one plant to another.

Both adult and infant spider mites cause damage by sucking plant sap from leaf openings on the underside of the leaf. A spider mite that has settled on the back of a leaf first creates a web from its threads, protects itself and creates conditions for its development, and then begins to lay eggs in this place. The pest lays an average of 140 eggs during its life, and sometimes up to 600 eggs.

Larvae hatched in early spring turn into adult web spiders in 7-10 days, and in the summer months in 2-5 days. Depending on the air temperature, she gives birth on average 16-18 times. Spider mites develop and spread quickly, even if they appear in small numbers, they can multiply and cause harm in a short period of time.

Typically, spider mites primarily damage cotton sprouts on branches and banks that are poorly fed, insufficiently processed, and are delayed in growth and development due to lack of water. Cotton seedlings infected with spider mites are retarded in growth and development compared to healthy cotton. Spider mites primarily settle on the underside of leaves and damage them. Wraps the sheet with very thin gray threads. Spider mites feed by sucking substances from leaves with their mouthparts. With severe infection, brown and reddish spots appear on the upper side of the affected leaves. Severely damaged leaves fall off and the plant becomes bare . The sooner the spider falls, the more damage it will deal. 50-60% if it falls in June, 2-6% if it falls in August. The body is oval, 0.3-0.6 mm long. Spider mites develop in 8-12 days in summer (June, July, August), 15-20 days in May and 25-30 days in March and April. During the year it produces 12-20 generations, of which 8-12 generations occur in June and August. The female lays up to 100-160 eggs in medium-fiber cotton varieties and lives for 30-40 days. Lays 40-50 eggs on fine-fiber cotton varieties and lives for 10-15 days.

Affected leaves turn yellow and begin to fall off. Red-brown spots on the leaves of cotton seedlings can be used to determine whether they are infected with spider mites.

The spider mite changes the vital activity of cotton seedlings, that is, it disrupts the activity of photosynthesis and metabolism in the leaf, causing the plant to wither.

Aphids *(Aphis gossypii Glov.),* aphids, are a subfamily of insects with similar beaks. About a thousand species are known. Their body length is 0.5-6.0 mm, ovoid or oval in shape, color from light green to brown. The head is movable, the stinging mouthparts have the shape of a khartoum and consist of segments starting from the back of the head. The whiskers have 3-6 segments. Often wingless. Lives in groups. Birds migrate from one plant to another. Aphid development cycle: usually overwinters as eggs on biennial or perennial plants; in the spring, a wingless female, the founder, emerges from the egg and gives birth to 50-70 larvae, which soon develop into adults; Adults of the second and next generation are also wingless (parthenogenetic, they reproduce by viviparity and produce wingless female offspring). The development cycle ends with the laying of fertilized eggs.

The development period of aphids is 3-20 days, depending on air temperature. In summer, the female lives up to 14 days. Winged females give birth to 1-2 larvae per day, and wingless females give birth to 5-10 larvae. Low rainfall creates good conditions for aphid development; Heavy rains with large droplets and heavy rain wash away open-living lichens. Plant lice suck sap from leaves and stems. As a result, the supply of carbohydrates in the stem and root of the plant is sharply reduced. This causes curled leaves, twisted branch growth, diseased tissue, swelling, boils and other growths. The productivity of damaged plants is reduced by 15-20%. In addition, lice also spread dangerous diseases by sucking the sap of diseased plants.

Several species of lice damage cotton. Among them, alfalfa black weevil, polysis or cotton weevil, large cotton weevil and root weevil cause serious damage to crops. Among them, the dangerous ones include the alfalfa or acacia louse, the cotton or polysis louse, and the large cotton louse. Lice develop in 3-20 days depending on temperature, and 20-26 alfalfa lice produce 15-20 offspring per season. Females live 18 days in summer and give birth to up to 150 larvae. The larvae develop and molt 4 times and live for 5 years. The body of the female is shiny black, 1.3-2.2 mm long , the length of the cotton weevil is 2-3.5 mm.

Cotton lice are omnivores and damage more than 50 plant species. These pests damage cotton from germination to harvest. Sometimes cotton lice can cause yield reductions of up to 50-75 percent. In spring, boll weevils suck cotton seedlings from the growing point and the juice of the leaves, retarding the growth of seedlings for up to 2 weeks. If black aphids fall off in the fall, the harvest does not decrease in quantity, it contaminates the fiber and seriously impairs its quality. In some oil and cool years, cotton seedlings are seriously damaged by high soil moisture.

Most cotton weevils (except boll weevils and boll weevils) overwinter on alfalfa, nightshade, and weeds during the laying season. In early spring, when the average daily air temperature is above 8-10 ^{0}C, aphids hatch from eggs, feed mainly on weeds and begin to reproduce. In summer, aphids reproduce by parthenogenesis. As a result, dense colonies are formed on the growing point, leaf and trunk of the plant in a short period of time. As a result of the fact that aphids suck the juice from young leaves, the leaves do not swell. Cotton sprouts lag behind in growth and development, and pods do not form on their lower branches.

Field and alfalfa shackles *(Lygus pratensis L, Adelphocoris Lineolatus Goeze)* - is an omnivorous insect in the broad sense and damages various cultivated plants. The body size of an adult shackle is slightly larger - 5.8-7.3 mm. Body color ranges from yellow-green to reddish-brown. There are 4 parallel dark spots on the front of the shoulder. There are rings of black spots along the anterior edge of the shoulder. On the leathery part of the front wings you can see 3 black smear-like spots and one spot in the upper part, next to the membrane. There are 3 dark transverse stripes on the thighs, two rows of hard chitinous growths on the shins, and the paws end in two claws. The color of the egg is transparent, translucent green, cup-shaped, 0.9-1.2 mm in size, the front part of the egg is blunt, the back part seems to be cut. Sometimes the laid eggs protrude into the upper part of the stem, the underside of which is smooth and reaches a width of 0.3-0.5 mm. If the egg-laying site is soft, the egg will go completely into the stalk. The size of the larva is 1-4 mm. A distinctive feature of the field shackle larva is that it has two black spots on the front and back of the shoulder and one black spot each on the back and abdomen. The first 3 years the larvae are yellow, 4-5 years - greenish-yellow. During the period of an adult insect, the field shackle overwinters under herbaceous plants, molts, separates from the offspring when the air temperature reaches 12 ^{0} C, and when the temperature rises to 16 ^{0} C, the shackle begins to fly in search of food. But the shackles, wintering under a thick blanket, begin to come out only when the temperature reaches 22-25 ^{0} C, that is, their mass emergence from hibernation lasts from the second half of March until the end of the first ten days of April.

The shackles varieties from the village are first harvested for the winter wheat harvest. After 9-12 days, females that have laid eggs are the first to leave the fields of autumn crops and gather in sedum, sedum, sorrel and other mass flowering flowering plants. Male shackle species leave the fall crops a week after the female species leave. Massive oviposition of female kandala on yag-jag and colza plants is observed in the second and third ten days of April.

Separate breeds of the second generation of field ants appear in mid-May, in the middle of the third ten days of May, they accumulate in large quantities in sorrel, sorrel and seed pods, and from this period the transition of individual species occurs. ants on cotton. Mass oviposition in alfalfa is observed at the end of May; oviposition occurs in sedum and other foreign plants growing in these fields, since alfalfa stems in the first year are thin and not suitable for oviposition. In alfalfa, eggs are laid on the side branches of the plant near the growth cone. Cockroaches lay up to 150-250 eggs. Egg laying in cotton begins at the end of May, and mass egg laying is observed in the first ten days of June. Lead-colored spots appear at the site of the pest's bite. In cotton, eggs are laid near the leaf stripe and stem growth cone. Larvae of the second generation of field caterpillars appear in mid-June in alfalfa and 5-7 days later in cotton. The emergence of some of the larvae of the third generation of shackles is observed 4-5 days after mass migration at the beginning of the second ten days of July. The fourth generation of the field caterpillar lays eggs in cotton at the end of August, and the full development cycle is completed in September. Since the beginning of October, there has been a massive migration of wildflowers (wormwood, peppermint, water pepper, boydaron, thistle, field ivy, etc.). A field shackle produces 3-4 generations during its life . The incubation period lasts 1.5 weeks, the development of the larvae is 25-30 days. The duration of development of the shackle from egg to adult depends on air temperature.

Cotton infected with shackle loses bolls, flowers, buds and bolls, and leaves turn yellow and dry out. Infection of cotton with caterpillars leads to a decrease in the intensity of respiration and the activity of oxidative enzymes in the plant, significant yield loss, deterioration in fiber quality, shedding of young crop elements and seed disability. Some reports observed that shackled cotton stems were significantly dried out, but were distinguished by the presence of unfallen pods, flowers, and young buds. Yellow drops of cotton sap appear on the affected areas of buds, buds and pods, which then air dry and turn black. Black spots appear on the affected areas of the crop elements. Due to several punctures around the spots, they increase in size and acquire a different color. The cyst becomes deformed and sometimes opens prematurely. This situation negatively affects the quality of cotton fiber and seeds. Over time, several punctures lead to peeling and cracking of the overlying part of the deformed tissue. Semi-liquid cystic juice, consisting of large cells, flows out of the crack. The inside of these pods changes, the fibers and seeds break down and turn into a brown substance that sticks to the gum. If fruit nodes are damaged, they will not develop and will dry out. When cotton is infected, the yield loss is 40-50%, and in some cases up to 70-80%.

Spiders *(Bemisia tabaci Gen.)* , Aleyrodins (Aleyrodinea) are a subfamily of insects belonging to the Aleutian order. Body length 1.3-1.8 mm. Adults are very mobile; it has wings covered with white powdery dust. Whiskers 3-7 segmented. The oral apparatus is suction type. Chala evolves with changes. Cockroaches are moisture-loving insects, so increasing air temperature and decreasing relative humidity have a negative impact on their development. The greenhouse codling moth (Trialeurodes Vaporarioum Westw) and the cotton or tobacco moth (Bemisia tabaciu) appeared in Uzbekistan relatively recently and primarily damage plants in greenhouses. However, in recent years they have widely spread to vegetable crops in open ground.

Greenhouse cockroach *(Trialeurodes Vaporariorum Westw.)* **.** This is a relatively new cotton pest. Akkanot began to adapt to cotton in the 1970s. The homeland of the whitefly is the tropics. The cotton moth affects mainly 3 generations from the end of May to the 3rd decade of July.

In regions of irrigated agriculture it produces 7-8 generations per year. Spider mite larvae suck out cell sap and negatively affect the development of plants, and in the viscous liquid they secrete, a sooty fungus develops, slowing down the assimilation process, so the spider mite causes double harm.

Tobacco thrips – (Thrips tabaci Lind) *Thripidae* – omnivorous insect. It can be found everywhere on earth. Tobacco thrips is a member of the winged family. This pest sucks the juice from cotton leaves and reduces its quality. Leaves infected with thrips decrease in weight and immediately break when sorted. The length of female tobacco thrips is 0.8-0.9 mm, the length of males is 0.6-0.7 mm. Adult tobacco thrips overwinter in the surface layer of soil under the remains of various plants and among weeds. Thrips wake up in early spring and feed on weeds. Once cotton is planted, it quickly becomes a weed.

The female thrips lays many eggs on young leaves at the tips of the cottons. Female thrips lay up to 100 eggs during their lifetime. Adult thrips are very mobile, constantly moving from one plant to another or from one field to another. Female thrips lay eggs on several plants. In summer, adult thrips live 10-25 days. 3-4 days after the eggs are laid, the larvae emerge. The larvae are less mobile than adult insects; they move only inside the leaf. But sometimes it moves to new leaves and nearby plants. The larva hatches after 10-15 days. In Central Asia, thrips reproduce at least 7-8 times during the summer. Thrips damage the cotton crop in the early period of development. Thrips settle on young shoots, leaves and growing points. They bite young leaves and cause them to tear. Cotton sprouts infected with thrips are stunted in growth and development, and the plant stems are extremely shortened and crippled. When cotton is infected at an older age, a silvery shiny spot appears on the back of the leaves, which then dries out. In cotton, thrips dies all summer, but it can only damage young shoots **.** The increase in the number of thrips in the spring (April-May) is the basis for their large numbers in cotton fields next year and causes the death of a significant part of the crop.

Cicadas - cicadas, cicadas (Cicadinea) are a subfamily of insects belonging to the order Winged. There are 17 thousand species known. Cicadas are very active insects. Body length 25-50 mm. The head is fixedly attached to the chest. In addition to compound eyes, it has 2-3 simple eyes. The wings fit tightly to each other, like the roof of a building, the front pair of wings being thicker than the rear ones. The whiskers and paws are three-segmented. The larval period is 5 years; lives in the soil and feeds on plant roots. Most species produce 1-2 generations per year. Development cycle – 4 years. (in the cotton cicada), some of them are 17 years old. (the cicadas singing) continues. Damages trees, shrubs and other plants by sucking leaf juice. Some species damage the ducts of the plant during egg laying. As a result, some parts of the plant die. Many species of cicadas can carry various viral diseases. More than 10 species damage cotton. The yellow beetle is especially dangerous. The wings of an adult yellow warbler are golden. Body length up to 30 mm. The whiskers are 3-segmented; the hind legs are a jumper. The embryo develops through transformation (egg, larva, nymph, adult). Lays eggs in June. The female pierces the upper part of the plant stem and lays 10-15 eggs (about 200 in total) in this place. As a result, the upper part of the plants withers and dries out. Up to 40% of damaged young shoots die. The larva that hatches from the egg enters the soil and feeds on the roots of the cotton plant. Three years pass before he becomes a nymph. Nymphs hibernate, become sexually mature insects in early spring, and emerge in May. The period for granting a joint venture is extended to 4 years. Adults appear in late May - early June, during the flowering period of cotton. The yellow warbler lives primarily in blueberry groves.

1.3. On the fight against sucking pests of cotton

Most crops are affected to varying degrees by various pests. Existing methods of protecting plants from pests do not protect the environment from various harmful effects, in particular from pollution by pesticides. In this regard, the most effective and convenient way to protect crops from pests is to select varieties that are resistant to these pests. This method dramatically reduces the use of pesticides, saves money spent on the production of various chemicals, and protects the environment from pollution by chemicals and their derivatives.

Even when pest numbers are high, when resistant varieties are planted, the damage they cause does not exceed the threshold of economic damage, and therefore there is no need to use pesticides.

V.N. Shchegolev [26], R. Painter [15] and P.G. Chesnokov [25] combine plant immunity to pests into 3 categories:

1. Antixenosis - the phytophage avoids the plant.

2. Antibiosis – the plant has a bad effect on phytophages (due to the antibiotic action of physiologically active substances).

3. Tolerance - the plant does not have a negative effect on the phytophage and does not reduce its productivity.

Although this combination is conditional, it is of great importance in the development of plant pest resistance breeding.

The development of views on plant immunity to pests made it possible to analyze the interactions in the biological system “phytophage-plant-host”, which, in turn, made it possible to develop new principles of phytoimmunology and identify constitutional and induced immunogenetic defenses. in plants.

Constitutional protection is protection associated with the specificity of morphological structures that provide plant immunity.

Constitutional protection includes:

1. Atreptic or dipolymerization properties, based on differences in the choice of the structure of proteins, fats and carbohydrates by insects and protection from degradation with the help of their enzymes (in such cases, the pest’s need for these substances is not satisfied and dystrophy occurs);

1. Morphological barriers are based on genetic differences in the development of plant organs, tissues and cells. This prevents or makes it difficult for phytophages to use the plant as food and habitat;
2. Barriers associated with growth - different growth rates of the vegetative or reproductive organs of the plant;
3. Physiological-metabolic barriers - resistant and unstable plants differ in physiological indicators and the nature of metabolism;
4. Ontogenetic barriers are the incompatibility of diachronic indicators (periods, stages, phases) during the individual development of resistant and unstable plants.

Induced barriers arise when a plant is infected, and such phytoimmunity barriers include:

1. Necrogenetic barrier - death of cells, cell complexes, parts of tissues and individual organs as a result of phytophagic damage and isolation of the pest (when infected by pests, sucking and mining occurs), making it difficult for the pest to feed.
2. Reparative barrier - the formation of organs similar to the damaged or lost organ.
3. Halogenetic and teratogenic obstacles - pathological formations - biliary (tumor) and parasitic teratomorphs - creation of a food environment and food source for the consumer [2 1];

metabolic products in the plant when damaged. This increases the harmfulness of these substances to the pest.

5. Inhibitory barriers - the formation of inhibitory compounds in infected plants. Such substances weaken the activity of hydrolytic and other enzymes of phytophages (amylase, protease, etc.) .

R. Painter identifies the following three areas of use of resistant varieties :

1. Variety resistance as the main method of protection;

2. Variety resistance as an additional method;

3. Variety resistance is a production method that prevents the emergence and spread of varieties that are more susceptible to pests than existing varieties.

The second direction is most often used as an additional method of pest control. Because in most cases, planting resistant varieties is not the only method that effectively protects a variety from a particular pest , and this method is only effective in combination with other protection measures. In some cases, the use of relatively resistant varieties increases the effectiveness of insecticides or other protective agents in small quantities (for varieties with low resistance, this amount may not be enough at all). In the third direction, the resistant variety will serve as a standard and compare the damage caused by pests to resistant and non-resistant varieties. As a result of this comparison, it is possible to avoid the widespread distribution of resistant varieties in production in the presence of resistant varieties.

Planting resistant varieties has a significant impact on the overall pest population, their abundance and other biological characteristics.

The above provisions and examples show that no pest control system can be complete unless resistant varieties are found and the nature of this resistance is not fully understood.

plants to pests, it is necessary to determine the characteristics of the reaction of a variety or form to a pest, as well as the degree of variability of this reaction depending on the age, condition and external environment of the plant. The plant's response to damage is determined by the form of damage to the affected organs. The damage caused by different pests to a certain part of the plant varies, and this should be taken into account when characterizing varieties for resistance. “Damage” means disruption of the integrity or function of a part of the plant. In most cases, the damage is caused by a pest feeding on the plant, and this is the main factor determining crop loss.

Agricultural pests with stinging mouthparts feed on nutrients from plant organs and pierce plant parts in various ways. For example, most aphids insert their stinging proboscis into plant tissue through the intercellular space where the cell remains intact (intracellular type). Some species of leafhoppers, spider mites and aphids insert their stinging proboscis into plant tissue through the cell wall (intercellular type) and cause serious damage to it. Some pest species use both methods [27].

Many biting pests (spider mites, aphids, leafhoppers) through their mealybugs introduce into the plant body enzymes produced by their salivary glands, which, in turn, affect the enzymatic activity of plant tissues and facilitate their nutrition. When a plant is damaged by pest bites, in most cases the color of the tissue changes; a bulge appears on the leaf plate and the leaf curls, dries out and falls off; infected branches, inflorescences and other parts become distorted; damaged pods and flowers fall off; characteristic swellings (galls) form in damaged tissues, and plant parts become distorted.

When a plant is damaged by a pest, the normal activity of the damaged parts is disrupted and a specific reaction occurs. This reaction is aimed at eliminating damage and restoring the function of the damaged part and depends on the characteristics of the plant, its condition and the time of damage.

When certain plants are damaged, they release various substances (resin, juice) from this place and thus limit the harmful activity of the pest. This type of reaction is characteristic of most woody plants and shrubs [13].

In cotton, various pests and microorganisms live in relationships and form specific populations. 214 species of invertebrates living, feeding and damaging cotton in the cotton-growing regions of Central Asia were taken into account, the biology and nature of the main pests were studied. Common pests of cotton include the Turkestan spider mite, root aphid, alfalfa, alfalfa and large cotton aphids, autumn nightworm, caradrina, bollworm, bast and spring armyworm, Asian and Moroccan locust, tobacco thrips, grass and alfalfa sedge, as well as some species of weevils. .

Based on the structure of the mouthparts and feeding method, these pests are divided into two groups:

-sucking pests - have stinging mouthparts (chelicerae), adapted for feeding on cell sap by piercing plant tissue;

- rodent pests - have a gnawing mouthpart, gnaw through plant organs and in most cases feed on young, juice-rich parts of the plant.

Boring pests cause significant economic damage to cotton fields and include spider mites, tobacco thrips, aphids, mealybugs, alfalfa bollworms, and yellow bollworms.

Stinging pests feed only on ready-made nutrients dissolved in the plant, and therefore the digestion of nutrients occurs outside the pest’s body, directly in the plant tissues. According to Z.L. Nevskaya and V.A. Bogolyubova, in cotton plants affected by polysis and large cotton juice, hydrolytic enzymes - amylase and invertase - are activated under the influence of insect enzymes. This ensures the transition of insoluble types of carbohydrates, soluble disaccharides and polysaccharides into monosaccharides - a form that juices can absorb.

If pests are removed from lightly infected plants, the physiological processes in the plant will easily return to normal. If the leaf blade is damaged by 50-75%, the plant is not able to eliminate the damage [14].

The ability to recover depends on the age and condition of the plant, since it is known that young plants are most damaged and, in turn, actively demonstrate the ability to recover. The external environment and growing conditions are very important for the plant to show its ability to recover. A plant provided with normal nutrients, in favorable conditions for growth and development, is less damaged than a plant in conditions that do not meet the requirements, and exhibits a high level of restorative ability.

There is also a form of resilience called "pseudo-resilience" which is often linked to the external environment. For example, low humidity and increased temperature reduce the number of pests that do not do well in such conditions, and less affected plants are considered resistant. But in a year when air humidity is high and temperatures are moderate, this variety can be completely damaged by pests. The plant is early ripening, and the early coarsening of its tissues makes it resistant to pests. In such cases, it is necessary to conduct special studies and test the descendants of the plant to determine the true level of resistance.

According to V.V. Yakhontov [29], the resistance of cotton to aphids and spider mites depends on the pubescence of the leaf and the osmotic pressure of the cell sap.

According to L.D. Anxa, hairy-leaved cotton varieties are highly resistant to aphids [6], [7].

Researchers have studied the resistance of several varieties to spider mites and concluded that varieties resistant to this pest have thick leaf blades and a high density of epidermal cells. According to some researchers, the thickness of leaf hairs and their length play an important role in the resistance of cotton to spider mites. spider mite.

According to S.A. Kemel et al., the main characteristics of the stability of cotton juice are the thickness of the epidermal layer and the osmotic pressure of the cell juice.

The effect of treatment with red light and a low-frequency electromagnetic field on the number of main insect pests of cotton leaves before sowing was scientifically studied by S.A. Mavlanova and A.M. Ismatov [10]. Regardless of whether the seeds were treated with red light or not, pests were present on the body of the plants, but the number of insects on the leaves of plants grown from untreated seeds was higher than on the treated plants at all growing times. observation. Insect numbers decreased over time in both control plants and plants grown from seeds treated with red light. The reason for this is explained by the activation of plant defense mechanisms in response to insect damage. These defense mechanisms were stronger in plants grown from seeds treated with red light.

According to S.A. Mavlanova and A.M. Ismatov, when treating seeds before planting with red light and a low-frequency electromagnetic field, plant resistance to the main pest - insects - increases, which leads to a sharp decrease in yield. It has been established that this is reflected in the number of phytophages in plants, depending on the type of insect and cotton variety (from 40 to 80%). Also, when seeds are treated before planting with red light and a low-frequency electromagnetic field, the leaf plate thickens, mainly due to an increase in the height of the epidermal layer and the thickness of the porous tissue, which determines the appearance of an effective mechanical barrier to the effects of stinging-sucking insects. Treatment with red light before planting seeds accelerates the synthesis of phytoalexins in plant tissues and is one of the factors that increases plant resistance to pests and diseases of cotton. Treatment with red light and a low-frequency electromagnetic field before sowing leads to an increase in cotton yield by accelerating the plant's defense mechanisms and the activity of the photosynthetic apparatus. Based on measuring the electrical parameters of the leaf blade and low-temperature chlorophyll fluorescence, effective methods for express diagnostics of cotton resistance to sucking pests and Verticillium wilt have been developed, as a result, it has been shown that the use of these environmentally friendly, safe and simple methods of increasing cotton resistance to insect pests is highly effective and promising.

G. tomentosum Nutt. former It seems. in the presence of a species, the appearance of characteristics that ensure tolerance to sucking pests in hybrids, in particular, the thickness of the leaf blade, the type of pubescence and the number of hairs, a number of quantitative and qualitative characteristics and indicators. biological characteristics of hybrids, quantitative indicators of leaf thickness, pubescence, some biochemical indicators in backcross generations of hybrids and their impact on the number of pests, the negative influence of 3-4-haired felt pubescence, characteristic of the wild type in terms of the number of pests, namely spider mites, has been established, that the total leaf thickness of hybrids is in the range of 250-300 microns, and the number of spider mites in leaves of such thickness is small M. B. Khalikova [22]]. indicated in the information.

In their study, the GHSaunders found *that G. raimondii* , a hairy trait that confers pest resistance, with an increased number of chromosomes (autopolyploidy) in *G. hirsutum* L. achieved transfer into the genome. According to the author, hairiness of plant organs has a dominant or epistatic nature of heredity compared to alleles of the hairlessness gene.

Cotton varieties with hairy leaves have been reported to be highly resistant to aphids [3]. The same opinion is found in other sources [4], [8], [12], [20], [18], [24], [28].

In subsequent years, the results of the analysis of plant resistance factors led to the conclusion that resistance depends not only on the anatomical and morphological characteristics of the plant, but also on secondary compounds and metabolites. These compounds act as food attractants or repellents [30], [31].

S. Chakrovorty and A. K. Rasular found that the highly resistant cotton variety G-9 had slightly higher concentrations of tannins.

The literature reports that cotton plants with very low levels of gossypol are severely damaged by pests.

According to F.K. Talipov [16], [17], the level of resistance of varieties depends on their varietal differences, in particular, the type of pubescence of plant leaves, the number of gossysexual glands, and the anatomical structure of the leaf. , and the fact that the plant is biochemically and physiologically different.

Gossypium L. The resistance of wild species of the family to these pests has been studied very little. MFShuster et al. studied 22 wild cotton species for spider mite resistance, examined the effect of the number of gossypol glands on plant resistance, and concluded that there was no correlation between the two traits.

Ch. Alibekova and M. Ishankulova [5] note that the number of aphids, thrips and spider mites was studied on 23 varieties of cotton in the Tashkent region. The conclusion of the research showed that the varieties S-6530, MIX 3, Ak-altin, Rannelistopadny, An-415, INEBR-85, Kirghizsky 3, S-9070, An-Khasildor, Fergana 3, Namangan 7, An-Uzbekistan are resistant to sucking pests, completely uninfested by sucking pests.

According to F. S. Talipov, 2”varieties “Lakshmi-”, “Lakshmi-”, S-3206, 06830 x S-6030 are resistant to spider mites, the total thickness of their leaves is 150.7-166.9 microns. 3”Varieties 06824, 06716, LB-439, 21223, 06819, 06704, S-4811, S-4227, 108-F, Tashkent-2 are resistant, their total leaf thickness is 79.5-134.8. µm [16], [17].

A.S. Dariev and A.A. Abdullaev [8] studied the leaf structure of a number of wild species and came to the conclusion that cotton resistance to spider mites and cotton sap depends on the morpho-anatomical structure of the leaf.

According to D.K. Saidov, the sap sticks to both sides of the leaf, and in most cases to the bottom of the leaf, and feeds by absorbing cell sap through the epidermis. Spider mites attach only to the underside of leaves (negative phototaxis) and feed on chlorophyll granules in the palisade layer.

feeds on chloroplasts in the uppermost part of the palisade parenchyma, as well as chlorophyll granules of the lower cell, forming chelicerae. It follows that the nutrition of pests is related to the length of their chelicerae, as well as the characteristics of the leaves. In adult spider mites, the size of the chelicerae is 117-121 microns, in larvae - 102-105 microns.

M.F. Shuster et al. proposed a 6-point scale for the degree of resistance of species. For example, the somewhat resistant species *G. lobatum, G. australe and G. nelsonii* have a resistance level of 1-2 points. Leaves of the first type are slightly pubescent, but the cuticle layer is thick (2 µm); in later types, the cuticle layer is thin (0.4 µm), but heavily pubescent, and the mesophyll cells are densely located. The species *G. darwinii* and *G. stockii* have 2 and 3 degrees of damage, the leaves of the first type are almost hairless, but the cuticle layer is thick (1.3-3 µm), the cuticle layer of the second type is thin (about 1 µm). µm), but the mesophyll cells are thick. The thickness of the parenchyma layer of these two species, combined with the thickness of the lower epidermal cells, exceeds the length of the spider mite chelicerae, and this species provides sufficient resistance to spider mites and aphids.

The amount and length of hair are also important in determining the level of longevity. For example, *G. raimondii and G. triphillum* are equally resistant to spider mites and aphids (2-3 points). The leaves of the first type are densely pubescent (50 pieces per 1 mm^2) and the length of the hairs is 250-320 microns, while in the second type almost 50% of the hairs have a length of 100-120 microns, and in the remaining almost 50% of the hairs have a length of 250-320 µm. half are 150-170 µm long. In both cases, the hairs become tangled and create an unfavorable environment for the pest to move along the leaf.

The authors include 8 species (3-3.5 points) in the group of moderately resistant species: *G.arboreum ssp.obtusifolium, G.herbaceum ssp. africanum, G. anomalum, G. somalense, G. incanum, G. tomentosum, G. Armorianum, G. Harknessii. The species G. klotzschianum, G. davidsonii, G. sturtianum, G. bickii* have slightly below average resistance.

According to the authors' conclusion, selection of cotton for resistance to spider mites should be carried out according to the following characteristics: plant leaves have dense pubescence (50-100 pieces per 1 mm 2 ⁾, if the leaf is hairless or very slightly pubescent, the cuticle layer is thick (1-2 microns). When the cuticle layer is not thick, in hairless plants resistance is provided by a cuticle of medium thickness (1-1.5 microns) and dense mesophyll cells.

According to A.D. Dadaboev, woolly varieties of *G. herbaceum L. are rarely affected by spider mites.* During an experiment conducted in 1951, the following situation was observed: aphids and thrips appeared on variety S-3210 in May-June. The variety is very badly damaged, only the stem is intact. S-7055 (*G.herbaceum L.*), planted next to this variety, was not damaged at all. Perhaps the biochemical composition and nature of the pubescence of the *G. herbaceum L. species* make it resistant to cotton pests, the author concludes.

According to the work of R. L. Knight [32], the wild cotton species *G. tomentosum* has two dominant genes (N_1 and N_2) that determine pubescence.

He named *G. tomentosum G. hirsutum* L. By crossing with the type and then backcrossing with the cultivated form he obtained a thick, hairy, rust-resistant comb.

Gossypium varies in resistance to sucking pests, including aphids, aphids, and boll weevils. Leaf hairiness can be measured or assessed qualitatively or quantitatively (trichome index).

In the work of F. M. Burland et al., leaves of cotton forms were classified according to pubescence into smooth, slightly hairy, pubescent, very pubescent and densely hairy.

Until 1985, a number of basic genes (N_1, N_2, N_6, *Sm2* , Sm1-smooth stem, smooth leaf, Sm3) and modifier genes (H3-stem, H4 - lower surface of the leaf, H5 - length) were identified. Because of possible allelic relationships between these genes, these hair thickness genes are grouped into 5 major loci (from t1 up to t5). The transmission of the allelic series was also renamed T1 [33]. The T1 locus is known to be part of cytological group IV on chromosome 6, as originally described by R. L. Knight [32] [34].

Wright et al. [35] later identified 4 QTL responsible for leaf pubescence in hybrids of G. *hirsutum (cultivars Empire* B2, *Empire* B3, *Empire* B2b6, S295) with *G. barbadense* (*Rima S7).* It was found that a QTL with a strong phenotypic effect is located on chromosome 6 and corresponds to the t1 locus, and the remaining 3 QTL are located on chromosomes 1, 7 and 25, and an additional QTL on chromosome 23. responsible for the pubescence of the plant stem. The authors hypothesized that the next QTL identified was transferred from the t2 locus to the t5 locus .

According to A. S. Dariev and A. A. Abdullaev, the wild polyploid *G. tomentosum Nutt. Former It seems* . with the participation of long-nosed and cycad-resistant forms with high fiber hardness. The leaves of these forms are heavily pubescent and can be used as donors.

N.G. Simongulyan [18], comparing the data he obtained as a result of his research with the data of K. Harland, recognized that as a result of the transfer of the hairiness trait of the wild polyploid species G. tomentosum to *G. barbadense, families resistant to spider mites were isolated.*

Akhmedov O.A., Khalikova M.B., Askarova Z. [2], [23], etc. In the cotton collection, some *G.arboreum l.* and *G. herbaceum l.* 01762 (Uzbekistan), 01774, 01781, 01788 (Turkmenistan), 01790, 01845, 02032, 02033, 01828 (China), 01830 544204 (India). Specimens related to G. herbaceum L., catalog numbers 01605 , 01666. , 01670, 03527 Participants in the study were: 04183 (India), 02043, 02056, 02059 (China), 03495 (Denmark), 03500 (Austria). The centers of natural origin of the species G.arboreum L. and G.herbaceum L. correspond to the geographical zones of wide distribution of various diseases and pests. That is why the characteristics of tolerance were formed in these forms and these objects have reached us. In the course of scientific research, the tolerance of the diploid species G.arboreum L. and G.herbaceum L., grown from representatives of the poplar of the Old World, to sucking pests was studied and the following results were obtained: poplar sap (Aphis gossypii Glov.) during the flowering period in samples related to to the species G.arboreum L. 1.1 Found within -5.6 pcs. In particular, the number of aphids under catalog numbers 01781, 01830 and 01845 is 3.4, respectively; 5.5; Make 5.6 (table 1.1) .

Table 1.1

Sucking pests collection specimens

damaged [8]

№	Намунанинг ПСУЕАИТИ каталог рақами	Келиб чиқиши	Ўсимлик сони	Битта ўсимликдаги зараркунандаларнинг ўртача миқдори, дона		
				шира	трипс	ўргимчаккана
G.arboreum L. намуналари						
1.	01762	Ўзбекистон	10	1.9	27.9	0.0
2.	01774	Туркманистон	10	1.3	20.4	0.0
3.	01781	Туркманистон	10	5.5	11.0	0.0
4.	01788	Туркманистон	10	0.0	5.3	0.0
5.	01790	Хитой	10	1.1	0.0	0.0
6.	01828	Хитой	10	2.7	23.3	0.0
7.	01830	Хиндистон	10	3.4	13.8	0.0
8.	01845	Хитой	10	5.6	3.8	0.0
9.	02032	Хитой	10	0.0	0.0	0.0
10.	02033	Хитой	10	0.0	2.7	0.0
G.herbaceum L. намуналари						
1.	01605	Хиндистон	10	0.0	2.1	0.0
2.	01666	Хиндистон	10	0.0	8.0	0.0
3.	01670	Хиндистон	10	0.0	19.3	1.8
4.	02043	Хитой	10	2.5	3.1	0.0
5.	02056	Хитой	10	3.0	0.0	0.0
6.	02059	Хитой	10	0.0	0.0	0.0
7.	03495	Дания	10	0.0	2.7	0.0
8.	03500	Австрия	10	0.0	0.0	0.0
9.	03527	Хиндистон	10	0.0	20.2	0.0
10.	04183	Хиндистон	10	0.0	5.5	0.0
	НСР			4.3	5.6	

of the studied samples was in the range of 2.7-27.9 pieces, and in samples catalog number 01774 (Turkmenistan) and 01762 (Uzbekistan) - 20.4; 27.9 pcs. Thrips were not observed on the leaves of only two samples with catalog numbers 01790 and 02032 (China). Spider mites (Tetranychus urticae Koch.) were not detected at all on the leaves of the studied samples belonging to the studied species G.arboreum L .. This indicates the resistance of the samples to spider mites. In samples of the diploid type G.herbaceum L., taken as starting material, pests suck : the number of aphids on the leaves of catalog numbers 02043 and 02056 (China) - 2.5; Make 3.0 pcs. It was noted that the number of aphids was not observed in the remaining samples. The number of thrips on the leaves of the studied samples ranged from 2.1 to 20.2 pieces. For example, the most 01666, 03527 and 01670 (India) sample catalog numbers, i.e. 8.0 respectively; 20.2; The presence of thrips in the amount of 19.3 pieces was noted. The number of thrips was 2162.7 and 212.7 pieces. in catalog samples with numbers 01605 (India), 03495 (Denmark), and on the leaves of catalog samples with numbers 02059

(China) and 03500 (Austria), the number of thrips was not observed. . In the samples belonging to the species S.herbaceum L., spider mites were present in only 1.8 pieces. in a sheet of plants belonging to catalog number 01670 (India). It was established that spider mites were not found in the remaining collection samples. It is generally accepted that diploid cotton varieties are resistant to pests as a result of natural selection and that insect abundance is low due to the thickness of the leaf blade and high hairiness .

Among the representatives of the Old World cotton, the collection includes specimens of G.arboreum L. and G.herbaceum L., resistant to aphids, thrips and spider mites. In particular, the use as starting material of samples belonging to G.arboreum L. type 02032, 01790 (China), 01788 (Turkmenistan), G.herbaceum L. type 02059 (China), 03500 (Austria), 01605 (India). When making a practical choice, it is emphasized that it corresponds to the intended purpose.

Based on the above, we can say that the inheritance of valuable economic traits in cotton and resistance to sucking pests, its nature, have been studied by a number of scientists. However, these studies were carried out to determine the factors of resistance and the mechanism of their influence on the resistance of the plant, but no scientific research was carried out on some morphological characteristics: the number of hairs on the leaf, their transmission form of heredity, variability and interdependence. Also, the study of the morphological and economic characteristics of cotton, despite the fact that our scientists have conducted many studies on the correlations between them, and achievements have been discovered and recommended for production , requires more and better research in this regard. . Based on this, in the course of our scientific research, we for the first time studied the genetic nature of some traits that ensure cotton resistance to sucking pests, namely the thickness of the cotton leaf blade, the number of hairs on the leaf and the type of hair structure, and determined the level of heredity.

CHAPTER II . INHERITANCE OF CHARACTERS PROVIDING RESISTANCE TO PESTS SPECIFIC TO *G. TOMENTOSUM.*

2.1. G. tomentosum Nutt. ex It seems about the type

Cotton is a plant belonging to the Malvaceae family of the genus Gossypium L. Gossypium L. is one of the oldest genera of plants on Earth. The first representatives of this generation appeared in the Cretaceous period and developed over tens of millions of years. Representatives of the genus Gossypium L. originally grew in forests of tropical latitudes, as a result of climate warming and forest retreat by adapting to a new ecological environment. Currently, such species are common in all tropical countries of the world. Most wild cotton species of the Old and New Worlds have a number of valuable traits and are therefore widely used in hybridization.

In the Old World, wild cotton species are found in the arid regions of Northwestern India, the deserts of Pakistan, Southeastern Arabia, the semi-deserts of Somalia, the Sahara Desert and some other regions. In the New World, wild American cotton is distributed on the arid northeastern coast of the Gulf of Mexico, the southwestern and western Pacific coasts of Mexico, the coastal islands of the Gulf of California, northwestern Mexico and Arizona, and the Pacific region. coast of northern Peru and the Galapagos Islands.

As a result of natural and artificial selection, perennial wild shrubs turned into semi-wild - ruderal forms. Of these, as a result of continuous evolution in nature and the influence of human activity, herbaceous forms arose with a one-year sympodial period of development, producing fiber and the fibers of which are suitable for the manufacture of textiles. Fiber of such forms was used by man until the cultivation of cotton.

G. tomentosum Nutt. former Seem (Fig. 2.1) type is a medium-sized bush, the plant is covered with dense hairs. The hairs on all organs - young parts of the stem, leaf and fruit bundles, leaves and other parts of the plant - are very short, the hairs are stellate tufts.

Figure 2.1. *G. tomentosum Nutt ex Seem type*

The plant hardly turns red in the sun or turns red very slightly. The leaves are medium-sized, three-lobed, sometimes five-lobed, deeply heart-shaped, pale green, gray in color, similar in leaf shape to G. *hirsutum.* similar to The leaf lobes are wide, ovate-triangular in shape, the tip is sharp and slightly elongated, the base is not narrowed. There are no leaf nectaries. The lateral leaves are lanceolate, long, slightly bent, almost pointed upward, pointed at the tip , *similar to the lateral leaves of G. barbadense* , and do not fall off very quickly. The fruit strip is long, thin, and does not bend. Gullon leaves are medium wide, ovoid, slightly heart-shaped, not fused with each other, with a brown tip attached to the pod and covering it. The buds are few (5-7), short, pointed, but not elongated at the ends. Their wings face in different directions. There are no external nectaries on the surface of the leaves, but internal nectaries located at the base of the leaves. The top of the cup is slightly wavy or almost flat. Nectarines inside the flower are covered with feathers. The inflorescence is cup-shaped, wide open. The leaves of Gultoi are pale yellow, shiny inside, without red spots below, and do not turn red when wilting. The male filaments are long, thin, yellow, and the anthers and anthers are yellow. The node is three-celled, sometimes 2-4-celled. The calyx is very small, elongated, with a long pointed apex. The surface of the pod is light green, smooth, matte; the glands are large, embedded in the tissue, but noticeable. False fences have sedge. The seeds are long, quite large, 3-4 in each pod. The fiber and hair are slightly differentiated, oval-colored. The hair is thick, not thick and long. The fiber is uneven, coarse, up to 10 mm long.

Geographical distribution. Hawaiian Islands: Grows on Oahu, Molokai, Maui. This species is endemic and is found nowhere else. Locals call this cotton Mao or Hulu-Hulu.

Biological properties. Drought resistant. Bacteriosis . _ *malvacearum)* And verticillium *(Verticillium)* d damaged. It is a short-day plant and is less affected by photoperiod. G. barbadense readily interbreeds with hirsutum and *tricuspidatum species* and produces fertile offspring. The first generation of hybrids will be vigorous and fertile. In subsequent generations, a very complex fragmentation occurs, leading to sterility, disharmony and sterility. G. *tomentosum* spp. *trilobum, Armourianum, Harknessii and Sturtia* interbreed with species. Crossing with other species has not yet produced results.

A polyploid species of New World cotton is G. *tomentosum,* which belongs to the section *Magnibracteolata.* is of great theoretical importance, since this species is the link connecting the flora of the Neotropical region with the Polynesian flora, and is the only endemic representative of the genus *Gossypium in the Pacific Islands.*

Gossypium L. is distinguished by species diversity and morphological originality. This series is still of great interest to scientists conducting research in the field of genetics, breeding and seed production of cotton. New species have also been discovered that have not been known to science to date, and their list is constantly growing. Until the 80s of the last century, only 36 species were known to science, and by the 90s this figure increased to 49 (P.A. Frixell, 1992), and later to 56. The latest species were discovered mainly by international expeditions to The Australian continent is still being carefully studied. The Old World species *G. arboreum*

L. and G. herbaceum L. and the New World species *G. hirsutum* L. and *G. barbadense L.* are cultivated species.

bushy plants that quickly adapt to the external environment, are resistant to drought and disease, and require short days (A.A.Abdullaev, A.S.Dariev, Kh.Saidaliev, M.B.Khalikova). .

A wild polyploid cotton species native to the Hawaiian Islands *is G. tomentosum Nutt. former It seems*. It is distinguished by its unique features. It has a number of features important for breeding and genetic research. Among them, scientific research aimed at solving pressing problems of our time is of great importance in solving the problem.

In 1932, under the leadership of *F. M.* Mauer, research began to study interspecific hybrids and determine the causes of their *infertility* . The resulting hybrids include *G. barbadense x G. tomentosum, G. hirsutum x G. tomentosum, G. tomentosum x G. harknessii, G. tomentosum x G. sturtii, G. tomentosum x G. armourianum and G. tomentosum x G. trilobum* There are also hybrids, and the author says that the following 3 hybrid plants are vigorous, no seeds were taken from them, and no information about these hybrids was found in the literature. Seedling F_1 of the hybrid *G. tomentosum x G. trilobum* died at a young age for unknown reasons. *G. tomentosum* , *G. hirsutum* and *G. barbadense* interbred easily, and their hybrids were vigorous and produced large quantities of seeds. A hybrid of *G.tomentosum* x *G.sturtii* was also produced easily, with vigorous plants but no seeds. The author reports that we have successfully applied the intermediate Michurin method and the *preliminary* vegetative approximation method to obtain interspecific hybrids *G. tomentosum* x *G.armourianum* and *G.tomentosum* x *G.trilobum.* But he did not mention how the same method was used.

Information in the scientific literature about the species *G. tomentosum* . Some sources provide information about the origin and identification of this species as a polyploid species. This source suggests that the distinct species *G. tomentosum evolved from some diploid species (probably harknessii)* that grew in this region as a result of the separation of the Hawaiian archipelago from the North American mainland during the separation of Pangea. or earlier .

G. tomentosum Nutt. Former It seems . the species is of great theoretical importance, since this species is the only species linking the Neotropical flora with the Polynesian flora, and the only endemic representative of the genus *Gossypium L. in the Pacific Islands.*

A.A. Abdullayev, summing up the results of his many years of research in the field of cotton taxonomy, revealed the importance of intraspecific and interspecific hybridization in cotton breeding. As a result of his research since 1957 on G. trucuspidatum , *G. barbadense L.* spp. *G. tomentosum Nutt. Former It seems* . mentioned that it can be mixed with type.

A. A. Abdullaev and others stated that wild *G. tomentosum Nutt. Former It seems* . and efficient hybridization of cultivated polyploid *G. hirsutum* Hybrids can be obtained, and this crossing works best if done under greenhouse conditions. Research conducted in subsequent years showed that these hybrids have increased germination and fertility in higher generations. In the F_1 joint , fiber output is inherited intermittently, and dominance of this trait is observed.

A.I. Kholmurodov, A.A. Abdullaev and others. *G. tomentosum Nutt. Former It seems* . and *G. hirsutum L. studied the inheritance of oil content in interspecific hybrids obtained with the participation of polyploid species, and* noted that the oil content in hybrids with the maternal variety S-6530 was up to 24.3%. In these hybrids, as a result of backcrossing, the speed also increases. By this sign you can select the $F_3 B_1$ generation.

Cotton selection is being enriched through the selection of hybrid forms with high morphoeconomic indicators.

Genetics is the theoretical basis of selection. Therefore, studying the level of heritability of quantitative traits in cotton is extremely important for practical breeding.

A number of studies have been conducted on the heredity of valuable economic traits and resistance to pests in cotton, but no studies have been conducted on the heredity, variability and interdependence of some morphological characters: the number of hairs on a leaf, their shape. . Also, the study of the morphological and economic characteristics of cotton, despite the fact that our scientists have conducted many studies on the correlations between them, and achievements have been discovered and recommended for production , requires more and better research in this regard. . Based on this, in the course of our scientific research, we for the first time identified some characteristics that ensure cotton resistance to sucking pests, namely the thickness of the cotton leaf blade, the type of hairs, the genetic nature of the number of hairs and the level of heredity.

2.2. Inheritance and variability of the leaf thickness trait in plants F_1

The goal was to study the quality of the fiber and resistance to sucking pests specific *to G. tomentosum* , as well as to determine the genetic nature and variability of the traits that provide this resistance. The following observational work was also carried out on hybrid plants: The thickness of the leaves was measured. in an MOV-3 eyepiece micrometer in 3 repetitions of hybrid combinations. The number of hairs on a leaf and their type were counted in triplicate using N821500 binoculars.

The genes involved in the phenotypic manifestation of hair types HSA $^{–hsA,\ HSD–hsD}$ $_{were}$ designated : H $^{-}$ hairs $_{hair\ '\ Spiral}$ hair type $^{-}$ “twist” - S, hair type simple - “simple” - S. s, A and D were designated as a group of genomes.

The second generation hybrids were planted in 15 cells in 4 replicates. At the same time, the number of plants in combinations ranged from 110 to 158 units.

A series of variations were made on the characteristics of the second generation hybrids, and the numerical indicators of the results were subjected to mathematical processing in the style of B.A. Dospehov:

$$\bar{x} = \frac{\sum X}{n} \qquad G = \sqrt{\frac{\sum (X-\bar{x})2}{n-1}} \qquad V = \frac{Gx100}{\bar{x}} \qquad m = \frac{G}{\sqrt{n}}$$

x – arithmetic mean ; _ G – arithmetic mean deviation .

X- options index y g' m - arithmetic mean error ; _

n – don’t choose size ; V - variability_ _ coefficient ;

F2 was calculated as $_{an}$ indicator of genotypic variability for the studied traits - the heritability coefficient using the formula.

The ratio of the main studied characters in parental forms and hybrids was determined using the following formulas.

$$r = \frac{\sum XY - (\sum X \bullet \sum Y) / n}{\sqrt{(\sum X^2 - (\sum X)^2 / n) \bullet (\sum Y^2 - (\sum Y)^2 / n)}}; \; m = \sqrt{\frac{1 - r^2}{n - 2}}; tr = \frac{r}{Sr}$$

where: r is the correlation coefficient between +1 and -1 will be _

X, U - symbols quantitative indicator ;

x, u – symbols average indicator ;

m – correlation _ standard error of the coefficient ;

n – number of observations ;

tr – correlation availability criterion

A wild polyploid cotton species native to the Hawaiian Islands *is G. tomentosum Nutt. Former It seems* . and *G. hirsutum* L. Hybridization was carried out between lines belonging to the type of interspecific hybrids and lines isolated as a result of a single selection and analysis by line L-001, belonging to the type *G. hirsutum L.* , in order to study the nature of heredity of some morphological characters, which ensure the quality of fibers and resistance to pests in the offspring, their genetic variability. As a result of the analysis, the heredity of economic traits and the thickness of the leaf blade, the number of hairs on the leaf and their type in the source material and the hybrids obtained with their participation were studied.

At the initial stage of our research, the morphological characteristics of these parental forms were studied (Table 2.1).

Table 2.1

Description of the main parent forms

T/r	Parent form	Weight of cotton in 1 bag, g	Fiber yield, %	Fiber length, mm	Hurry up day	Fiber Micronaire	Relative tensile strength, gk/tex	Sheet thickness, microns	Number of feathers piece 1mm ^{2}	Hair type
1.	L-001	5.2	34.5	32.0	96.7	4.4	28.6	142.6	9.0	Simple
2.	T-5/8	4.7	36.2	32.1	130.0	4.3	32.6	298.0	38.5	twistet
3.	T-21/24	5.2	35.3	31.6	122.6	4.5	31.4	274.7	46.4	twistet
4.	T-25/27	4.8	34.8	33.6	120.4	4.1	31.8	300.0	40.6	twistet
5.	T-26	5.4	34.5	32.4	128.8	4.4	32.5	242.6	20.3	twistet

In previous studies *of G. tomentosum Nutt. former It seems. It has been established* that interspecific hybrids involving backcross jointed plants have a high density of hairs, and the twisted type of hairs typical *of G. tomentosum* negatively affects the number of pests. Also, in these interspecific hybrids, hybrids with a large overall thickness of the leaf plate were relatively less affected by spider mites.

As a result of many years of research *on G. tomentosum Nutt. former It seems.* interspecific hybrids with participation are valuable recombinants in terms of fiber quality and type of pubescence, providing resistance to sucking pests, and their use as an initial source in breeding and genetic research is recognized as highly effective. In previous studies, interspecific hybrids involving this species were obtained that were resistant to sucking pests, the manifestation in their higher generations of some anatomical and morphological characteristics that provide resistance to spider mites, and how these characters affect the damage to the plant by pests. Also, since the main purpose of studying these hybrids is to determine their resistance to sucking pests, as a result of a series of field and laboratory analyzes (*Acala sj 5 x G.tomentosum*) x *Acala sj 5, [(MCU5 x G. tomentosum*) x *MCU5*] x Omad and from hybrids [(*G.tomentosum x MCU5*) x MCU5] x Omad, families resistant to spider mites (Tetranycus urticae Koch.) and cotton aphids (Aphis gossypii Glov.) were isolated. As a result of studying these families over several years, valuable ridges were identified from them, embodying valuable economic characteristics and signs of resistance to pests.

In our experiments, we obtained and studied hybrids using these lines to determine the heredity and intergenerational variability of leaf thickness, hair density and type.

In the original rows and first generation hybrids, the thickness of the leaf blade was determined individually in all plants for each hybrid combination during the flowering period of the plants.

Of the parent forms, the average thickness of the leaf blade in variety L-001 was 143.0 µm, in T-5/8 - 296.3 µm, in T-21/24 - 274.0 µm, in T-25/27. for the T-26 it was 298.1 microns, and for the T-26 it was 242.6 microns. In plants G' $_1$ obtained from the hybridization of these lines, the thickness of the leaf blade was 196.4-296.6 microns, and in combinations the indicator of this trait was manifested mainly in the dominance of the maternal form, and it was established that the role of the cytoplasmic gene is significant (Table 2.2).

The thickness of the leaf blade is 200.8-240.0 µm in combination with the L-001 ridge as the mother ridge (196.4-269.0 µm in reciprocal combinations), 247.1-293.1 µm in combination with the T-5 ridge /8 as maternal (232.4-296.6). µm in reciprocal combinations), 196.4-276.1 µm, when the T-21/24 ridge is taken as the maternal one (218.1-286.3 µm in reciprocal combinations), the T-25/27 maternal ridge 269.0- 296.6 µm (in reciprocal combinations 240.8-293.1 µm) with participation in the role of mother and 217.6-248.4 µm (in reciprocal combinations 200.8-278.5 µm). The degree of variability of the trait was 1.63-3.63% for combinations.

Table 2.2

Inheritance of leaf blade thickness in plants F_1, µm

T/r	Parent forms and F_1	M±m	With	IN%	hp
1.	L-001	143.0 ± 0.26	3.2 2	2.2 5	-
2.	T-5/8	296.3 ± 0.46	7.8 3	2.6 4	-

3.	T-21/24	274.0 ± 0.30	4.9 7	1.8 1	-
4.	T-25/27	298.1 ± 0.35	6.0 2	2.0 1	-
5.	T-26	242.6 ± 0.37	5.8 4	2.4 1	-
6.	L-001 x T-5/8	232.4 ± 0.34	5.2 7	2.2 6	0.16
7.	T-5/8 x L-001	248.3 ± 0.36	5.7 4	2.3 1	0.37_
8.	L-001 x T-21/24	218.1 ± 0.29	4.4 4	2.0 3	0.1 4
9.	T-21/24 x L-001	196.4 ± 0.40	5.8 4	2.9 7	-0.18
10.	L-001 x T-25/27	240.0 ± 0.54	8.7 1	3.6 3	0.2 5
11.	T-25/27 x L-001	269.0 ± 0.34	5.6 5	2.1 0	0.6 2
12.	L-001 x T-26	200.8 ± 0.43	6.1 3	3.0 5	0.16
13.	T-26 x L-001	217.6 ± 0.43	6.2 6	2.8 7	0.49
14.	T-5/8 x T-21/24	247.1 ± 0.27	4.3 0	1.7 4	-3.4 1
15.	T-21/24 x T-5/8	270.8 ± 0.29	4.8 6	1.7 9	-1, 28
16.	T-5/8 x T-25/27	293.1 ± 0.34	5.8 2	1.9 8	-4.55
17.	T-25/27 x T-5/8	296.6 ± 0.38	6.5 9	2.2 2	-0.6 6
18.	T-5/8 x T-26	266.3 ± 0.38	6.2 8	2.3 6	-0.1 1
19.	T-26 x T-5/8	248.4 ± 0.25	4.0 5	1.6 3	-0.78
20.	T-21/24 x T-25/27	276.1 ± 0.29	4.7 8	1.7 3	-0.8 2
21.	T-25/27 x T-21/24	286.3 ± 0.40	6.9 8	2.4 3	0.02
22.	T-21/24 x T-26	267.4 ± 0.37	6.1 5	2.3 0	0.57
23.	T-26 x T-21/24	237.7 ± 0.46	7.0 1	2.9 5	-1.3 1
24.	T-25/27 x T-26	278.5 ± 0.35	5.8 7	2.1 0	0.29
25.	T-26 x T-25/27	244.8 ± 0.29	4.5 4	1.8 5	-0.9 2

EKF $_{05}$		9.3			

The trait dominance index varied from –4.55 to 0.62 in hybrid combinations. In 10 cases, low values were observed compared to the average values of the parental lines (hp = -4.55-0.18), negative heterosis in 4 cases and intermediate values in 10 cases (hp = 0.02-0.57). .

A study of the thickness of the leaf blade in hybrids showed that this trait develops mainly under the influence of the maternal form.

2.3. In F1 plants Inheritance of hair type and number of hairs on a leaf blade

In nature, there are wild and semi-wild forms of cotton that are resistant to various pests and extreme conditions and at the same time have high fiber quality. One of them is G. tomentosum Nutt, a wild polyploid species endemic to the Hawaiian Islands . *former It seems.* counts

According to G.Kh. Saunders, the trait of pubescence of cotton organs has a dominant or epistatic nature of inheritance in relation to the alleles of the hairlessness gene.

determined the number and type of hairs at the level of 1 mm ^{2} of the leaf blade in the original parental forms and the resulting hybrids in order to study the nature of inheritance of the type of hairs characteristic of this species.

The number of hairs on the leaf blade and the type of hairs in the original lines and first generation hybrids were determined individually in all plants for each hybrid combination during the flowering period of the plants.

Based on the type of hair growth, the studied parental forms were divided into two phenotypic classes (“normal” and “curled”). Based on the data obtained, only one line L-001 had a “normal” hair type, and we designated this trait as conditionally homozygous. In the remaining ridges T-5/8, T-21/24, T-25/27, and T-26, we identified a second alternative phenotype as the “twisted” type.

$_1$ had a characteristic phenotype of the “twisted” type, without reciprocal differences, in all combinations (“twisted” x “normal”), (“twisted” x “twisted”). "), according to the type of pubescence studied in G' 1. Thus , in F_1 plants, the “twisted” type of hairs completely dominates.

$F_{'1}$ plants we studied, the type of pubescence at the leaf level was “twisted”, and this type completely dominated the phenotype, regardless of the direction of hybridization, and it was observed that this gene is located in the nuclear chromosome.

In conclusion, it can be noted that as a result of genetic analysis, ridges involved in hybridization according to the type of pubescence at the leaf level were described in the following genotype for the trait:

L-001 – $h^s{}_A h^s{}_A h^s{}_D h^s{}_D$

T-5/8 – HS $^A{}_H{}^S{}_A h^s{}_D h^s{}_D$

T-21/24 – $H^S{}_A H^S{}_A h^s{}_D h^s{}_D$

T-25/27 – $X^C{}_A X^C{}_A x^s{}_D x^s{}_D$

T-26 – $h^s{}_A h^s{}_A H^S{}_D H^S{}_D$

Thus, depending on the genotypes of the lines involved in hybridization, the phenotypic manifestation of the trait in $F_{1\ \text{plants showed a “twisted” type,}}$ regardless of the parental line and hybrid.

Thus, a state of complete dominance of the curled hair type over the normal one was observed (Table 2.3.1).

^{2} sheets from the parent forms are 9.0, T-5/8 38.5, T-21/24 46.4, T-25/27 were 40.6 units. and 20.3 units. at the T-26.

plants F_1 obtained as a result of hybridization , the number of hairs per 1 mm 2 of leaf was in the range of 19.7-46.5 pieces, and the indicator of this trait was different in combinations (Table 2.3.1).). In combinations where comb L-001 acted as the mother comb, the number of hairs per 1 mm $^{2\ \text{leaves}}$ was 22.3-44.2 pcs. (19.7-40.3 pieces in reverse combinations). The dominance index in reciprocal hybrid combinations obtained with the L-001 line is one hour. =0.31-1.35, which indicates the influence of the cytoplasm in certain combinations.

32.5-44.8 units. in combinations where the T-5/8 ridge acted as the mother ridge (31.6-44.6 units in reciprocal combinations), 40.2-46.5 units. in combinations where the T-21/24 ridge acted as the mother comb (39.8-44.8 units according to mutual combinations), 29.8-42.1 units. in combinations where the T-25/27 comb was used as the mother comb (by mutual combinations

Table 2.3.1

Type of leaf pubescence and hairs in F_1 plants

number heredity

Т/р	Ота-она шакллар ва F_1	Тукланиш типи	1 мм² даги ўртача туклар сони X±m	σ	V%	hp
1	2	3	4	5	6	7
1.	Л-001	Оддий	9,0±0,17	0,76	8,42	-
2.	Л-001 х Т-26	Бурама	22,3±0,16	0,74	3,34	1,35
3.	Т-26 х Л-001	Бурама	19,7±0,10	0,45	2,29	0,89
4.	Т-26	Бурама	20,3±0,17	0,77	3,79	-
5.	Л-001 х Т-21/24	Бурама	44,2±0,36	1,64	3,71	0,88
6.	Т-21/24 х Л-001	Бурама	40,3±0,22	1,01	2,52	0,67
7.	Т-21/24	Бурама	46,4±0,42	1,90	4,11	-
8.	Л-001 х Т-25/27	Бурама	39,1±0,30	1,36	3,48	0,90
9.	Т-25/27 х Л-001	Бурама	29,8±0,16	0,73	2,44	0,31
10.	Т-25/27	Бурама	40,6±0,37	1,68	4,14	-
11.	Л-001 х Т-5/8	Бурама	36,7±0,23	1,37	3,75	0,87
12.	Т-5/8 х Л-001	Бурама	36,7±0,20	0,93	2,53	0,87
13.	Т-5/8	Бурама	38,5±0,28	1,27	3,29	-
14.	Т-5/8 х Т-21/24	Бурама	44,8±0,26	1,18	2,64	0,59
15.	Т-21/24 х Т-5/8	Бурама	44,6±0,33	1,51	3,39	0,54
16.	Т-5/8 х Т-25/27	Бурама	40,3±0,21	0,96	2,39	0,96
17.	Т-25/27 х Т-5/8	Бурама	39,6±0,22	1,01	2,56	0,04
18.	Т-5/8 х Т-26	Бурама	32,5±0,24	1,10	3,39	0,34
19.	Т-26 х Т-5/8	Бурама	31,6±0,20	0,89	2,83	0,24
20.	Т-26 х Т-21/24	Бурама	39,8±0,26	1,17	2,94	0,49
21.	Т-21/24 х Т-26	Бурама	40,2±0,26	1,18	2,94	0,52
22.	Т-26 х Т-25/27	Бурама	33,1±0,18	0,81	2,45	0,26
23.	Т-25/27 х Т-26	Бурама	30,1±0,21	0,95	3,17	0,03
24.	Т-21/24 х Т-25/27	Бурама	46,5±0,37	1,69	3,64	1,03
25.	Т-25/27 х Т-21/24	Бурама	42,1±0,30	1,34	3,20	-0,48
ЭКФ05			9,4			

33.1-46.5 units), and T-26 - 19.7-39.8 units.

The degree of variability of the trait was 2.29-3.75% for combinations.

The sign dominance index in hybrid combinations is –0.48. ranged from 1.35. In 1 case, a low index was observed compared to the average indicators of the parent lines (hp = -0.48), in 17 cases intermediate indicators were recorded (hp = 0.03-0.96), in 2 cases extreme dominance-heterosis was observed. shown to have happened.

In conclusion, it can be noted that a comparative analysis of parental forms and G' $_{1\ \text{plants}}$ revealed the following patterns for the studied characteristics:

- In the ridges isolated from the upper generations of interspecific hybrids *G. tomentosum* and *G. hirsutum, the pubescence at the leaf level was of the “twisted” type,* and in all the studied reciprocal hybrids (“twisted” x “normal”) G. The resulting plants showed complete dominance of the trait and the hairiness of the “twisted” type was phenotypically manifested (Fig. 2.3.1);

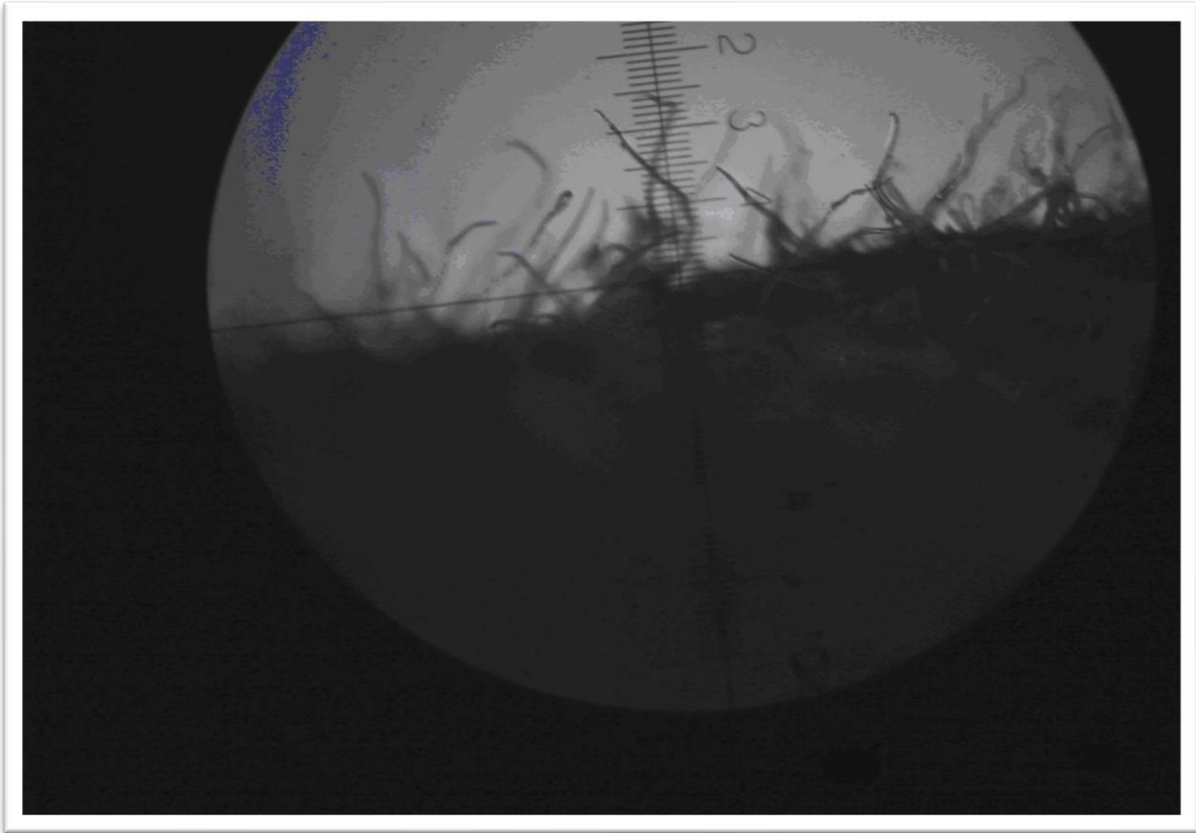


Figure 2.3.1. “Twisted” type of pubescence on the leaf blade.

- the number of hairs on a leaf per 1 mm ^{2} is different in the parent ridges, the smallest indicator is the normal type of pubescence, characteristic of ridge L-001, the type of pubescence in the remaining ridges is “twisted”, and the number of hairs is up to 20-46 pieces in interspecific ridges;

- inheritance of the number of hairs in the first segment indicates that the control of the trait is polygenic, and we see that G' 001 ra$_{1\ \text{plants}}$ obtained with the presence of lines, compared with the analytical line L-, showed incomplete superiority, dominance and positive heterosis. A similar pattern was noted in G'1 plants with curled hairy ridges;

When inheriting (phenotypic manifestation) of other traits in F_1 plants, incomplete, complete dominance, average dominance, positive and negative heterosis of traits were observed.

Variability, heritability and heritability index of leaf blade thickness in F_2 plants .

There are various methods of pest control, including agronomic, genetic, environmental and others. The most effective, productive, environmentally friendly method of combating such pests is to search for donors (genotypes) with natural resistance factors, obtain and introduce varieties using them. Of course, this process takes a lot of time, but the result is savings in money spent on pest control and a reduction in environmental pollution from various chemicals.

The properties of plant resistance to pests are determined by 3 groups of factors: factors that repel the pest from the plant; antibioticosis; Factors ensuring plant resistance to pests. From an immunological point of view, the first two groups are more practical. They are the determining factors of true sustainability.

As a result of many years of painstaking research by breeders and geneticists, cotton varieties have been created that are somewhat resistant to a number of diseases, including root rot and wilt. But there are no cotton varieties that are naturally pest-resistant. Data on cotton resistance to pests began to appear in the literature at the beginning of the 20th century, but by now most of this data has been proven and several factors of resistance have been identified.

According to most researchers, the resistance of cotton to sucking pests depends on the morphological characteristics of the plant (hair type, hair density), biochemical composition (mono- and polysaccharides, amount of secondary metabolic products) and the anatomical structure of the leaf (cuticle, structure of the mesophyll layer, thickness, level of development of mechanical tissues), leaf shape, side, flower, etc.).

Of the parent forms, the average thickness of the leaf blade in variety L-001 is 144.5 microns, in T-5/8 - 294.0 microns, in T-21/24 - 272.5 microns, in T-25/27. it is equal to 295.0 microns, and for T-26 it is 242.5 microns.

Despite the fact that the dominance index hp = -4.55 to +0.62 in $_{\text{G'1 plants}}$ obtained with the presence of the above ridges, the thickness of the leaf blade in $_{\text{G'2 plants}}$ is in the range of 202.1-293.5 microns . , and in combinations, the role of cytoplasmic genes is manifested in the indicator of this trait (Table 2.4.1).

The thickness of the leaf blade is 202.4-242.0 µm in combinations in which the mother ridge is L-001 (in reciprocal combinations 202.1-264.9 µm, variability 3.05-5.15), degree of variability of the trait in combinations 2.96. - amounted to 4.99%.

Comb T-5/8 245.1-290.0 µm in combinations with maternal participation (230.5-293.5 µm in reciprocal combinations, variability 2.96-3.85), degree of variability of the trait in combinations 3.05 - amounted to 4.17%. Roller T-21/24 is 202.1-270.2 µm in combinations of maternal origin (220.0-284.1 µm in reciprocal combinations, variability - 3.13-4.17%). The degree of sign variability for these

Table 2.4.1

Variability and heredity of the thickness of the leaf blade in the parental form and plants F_2

Т/р	Parent forms and F2	n	M±m	σ	V%	h^2
1.	Л-001	20	144,5±0,22	3,24	2,25	
2.	Т-5/8	20	294,0±0,88	3,94	1,34	
3.	Т-21/24	20	272,5±0,91	4,10	1,50	
4.	Т-25/27	20	295,0±0,50	2,23	0,75	
5.	Т-26	20	242,5±0,91	4,10	6,91	
6.	Л-001 x Т-5/8	125	230,5±0,61	6,83	2,96	0,20
7.	Т-5/8 x Л-001	111	246,0±0,71	7,51	3,05	0,25
8.	Л-001 x Т-21/24	116	220,0±0,29	6,89	3,13	0,39
9.	Т-21/24 x Л-001	118	202,1±0,81	8,83	4,37	0,47
10.	Л-001 x Т-25/27	118	242,0±0,95	10,37	4,28	0,42
11	Т-25/27 x Л-001	110	264,9±0,89	9,42	3,55	0,47
12.	Л-001 x Т-26	120	202,4±0,92	10,11	4,99	0,50
13.	Т-26 x Л-001	133	220,1±0,98	11,30	5,13	0,40
14.	Т-5/8 x Т-21/24	145	245,1±0,84	10,22	4,17	0,44
15.	Т-21/24 x Т-5/8	134	267,1±0,86	9,95	3,72	0,41
16.	Т-5/8 x Т-25/27	131	290,0±0,94	10,82	3,73	0,39
17.	Т-25/27 x Т-5/8	152	293,5±0,85	10,59	3,60	0,36
18.	Т-5/8 x Т-26	124	266,1±0,85	9,57	3,59	0,31
19.	Т-26 x Т-5/8	119	246,1±0,87	9,50	3,85	0,38
20.	Т-21/24xТ-25/27	121	270,2±0,86	9,47	3,50	0,45
21.	Т-25/27xТ-21/24	128	284,1±0,89	10,14	3,56	0.41
22.	Т-21/24 x Т-26	115	265,4±0,94	10,08	3,79	0,44
23.	Т-26 x Т-21/24	158	234,3±0,74	9,33	3,98	0,36
24.	Т-25/27 x Т-26	136	275,4±0,95	11,12	4,03	0,47
25.	Т-26 x Т-25/27	122	240,0±0,85	9,45	3,93	0,42

combinations was 3.50-4.37%.

264.9-293.5 µm in combination with the T-25/27 ridge, acting as the mother ridge (240.0-290.0 µm in reciprocal combinations, variability 3.50-4.28%)

for combinations - 3.55-4.03%.

The T-26 roll was 220.1-246.1 µm in combinations that participated as maternal ones (202.4-275.4 µm in reciprocal combinations, variability 3.59-4.99%). The degree of variability of the trait by combination was 2.96-5.13%.

Inheritance of the leaf thickness trait in these hybrids.

levels were moderate to strong, with scores ranging from 0.20 to 0.50.

The data obtained indicate that the influence of agrotechnical measures, the number of plants per hectare and the external environment as a whole is very significant.

2.5. The genetic nature of inheritance of hair type in F_2 plants .

According to the literature, in *G. tomentosum Nutt ex Seem* the number of hairs on the leaf surface is controlled by polygenes. According to the authors, they have proven that some alleles of these genes are located on some chromosomes. According to Kh. Saydaliev and A. Kholmurodov, it was established that the hairs on the surface of the leaf have a twisted shape, and this type of hairs, along with other factors, ensures that the pests that suck on it cannot stick to it.

Kh. Saydaliev and M. Khalikova found among the sources obtained by hybridization of the species G.tomentosum and G.hirsutum, combs in which the hairs on the leaves and body of the plant had a unique “twisted” shape, but we were unable to find any data in the literature about the genetic control of this hair type...

Therefore, the nature of heredity of this trait has not been sufficiently studied by the mentioned researchers.

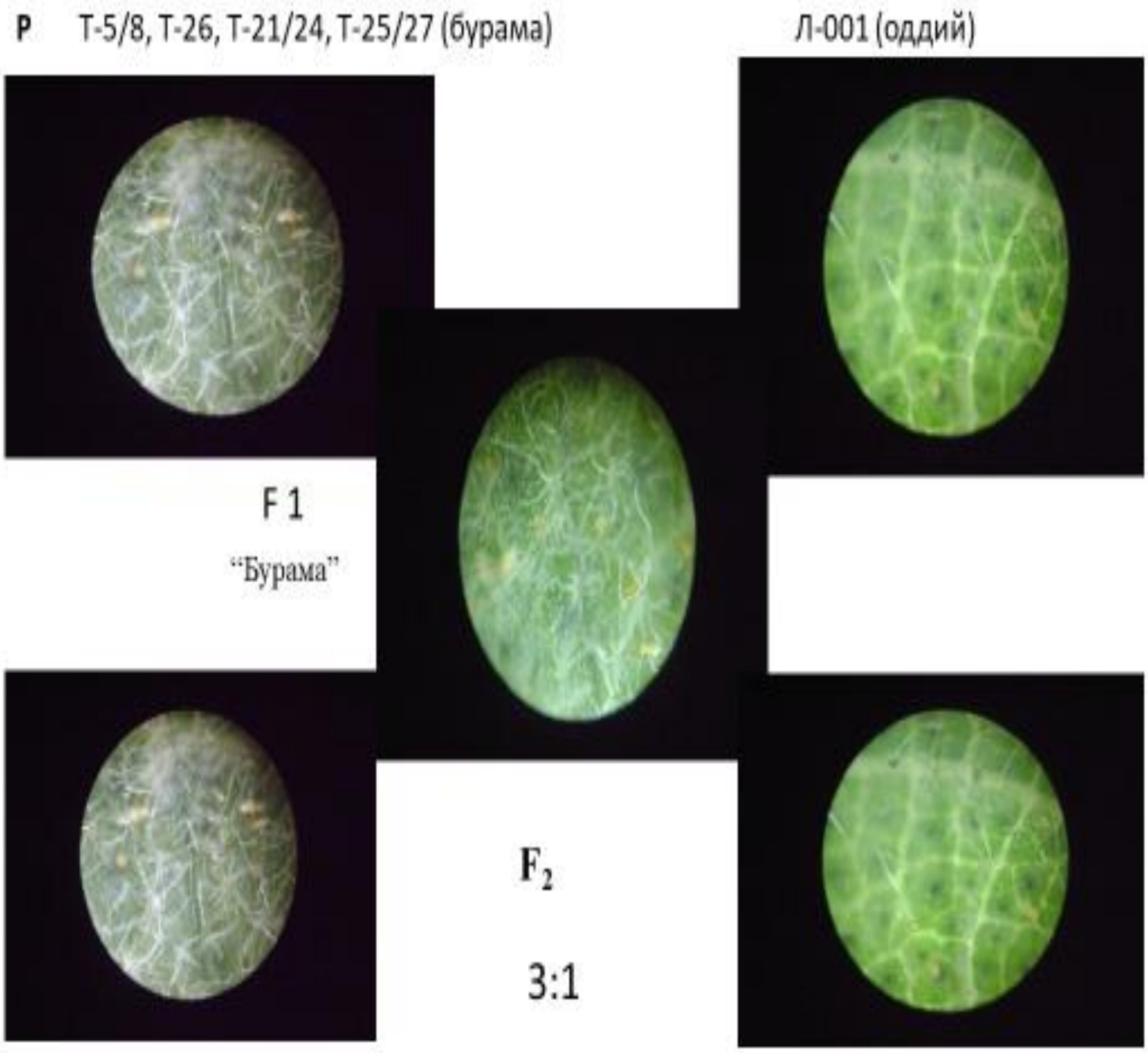
Based on the type of pubescence in all the combinations we studied in generation F_2, hybrid plants were divided into two phenotypic classes:

1. “Spiral” type;

2. "Normal" type.

The phenotypic groups “Twisted” x “Normal”, obtained by self-pollination of F1 plants , gave 3:1 segregation in F2 hybrid combinations (Fig. 2.5.1).

Figure 2.5.1.



Focusing on the tabulated data, these phenotypic groups show that the parental forms are markedly differentiated by allelic states of a single gene, suggesting that the experimental data closely matches the observed theoretical ratio of 3:1 (Table 2.5.1).

This opinion was further clarified by the fact that the results obtained were close to the 1:1 ratio that was obtained by rehybridizing the L-001 line with G' 1 hybrid plants, i.e. backcrossing hybrids . In the hybrid combinations studied, it was possible to prove that the parental forms were truly monogenic, and the F_1 plants were monoheterozygous.

Table 2.5.1

"Spiral" and "simple" ridges in F_2 plants . inheritance of leaf blade pubescence type

№	F_2	n	Twisted	simple	Theoretical expected ratio	χ^2	P
1.	F_1Л-001 x T-5/8	20	20	-	-	-	-
2.	F_2Л-001 x T-5/8	125	98	27	3:1	0,77	0,50-0,20
3.	F_B(Л-001 x T-5/8)xЛ-001	80	49	31	1:1	4,05	0,05-0,01
4.	F_1Л-001 x T-21/24	20	20	-	-	-	-
5.	F_2Л-001 x T-21/24	116	80	36	3:1	2,25	0,25-0,10
6.	F_B(Л-001 x T-21/24)xЛ-001	74	28	46	1:1	4,36	0,05-0,01
7.	F_1Л-001 x T-25/27	20	20	-	-	-	-
8.	F_2Л-001 x T-25/27	118	91	27	3:1	0,28	0,75-0,50
9.	F_B(Л-001 x T-25/27)xЛ-001	95	44	51	1:1	0,52	0,50-0,25
10.	F_1Л-001 x T-26	20	20	-	-	-	-
11.	F_2Л-001 x T-26	120	89	31	3 :1	0,04	0,99-0,95
12.	F_B(Л-001 x T-26)xЛ-001	62	25	37	1:1	2,32	0,25-0,10
13	F_1T-5/8 x Л-001	20	20	-	-	-	-
14	F_2T-5/8 x Л-001	111	85	26	3:1	0,14	0,75-0,50
15	F_B (T-5/8 x Л-001)xЛ-001	67	38	29	1:1	1,2	0,50-0,25
16	F1T-21/24 x Л-001	30	30	-	-	-	-
17	F2T-21/24 x Л-001	118	90	28	3 :1	0,09	0,99-0,95
18	FB(T-21/24x Л-001)xЛ-001	71	30	41	1:1	1,71	0,25-0,10
19	F1T-25/27 x Л-001	30	30	-	-	-	-
20	F2T-25/27 x Л-001	110	81	29	3 :1	0,10	0,75
21	FB(T-25/27x Л-001)xЛ-001	68	29	39	1:1	1,46	0,25-0,10
22	F1T-26 x Л-001	30	30	-	-	-	-
23	F2T-26 x Л-001	133	101	32	3 :1	0,06	0,99-0,95
24	FB(T-26 x Л-001)xЛ-001	80	43	37	1:1	0,45	0,50

In “Burama” x “Burama” plants of the second generation in hybrid combinations of combs T-5/8, T-21/24, T-25/27 and T-26, a predominantly curled phenotype was observed, and in some combinations normal hairiness was observed. That is, in some of these hybrids there was no separation by characteristics. This indicates that the gene providing the trait T-5/8, T-21/24, T-25/27 belongs to the same series and is in a homozygous state.

F_2 in some hybrid combinations “Burama” x “Burama” (twistet) a small number of plants were identified with a recessive type of pubescence at the leaf level - the “normal” type of pubescence. Of the plants of this combination, 15:1 were in “normal” fertilization, and the remaining 15/16 were plants with a “distorted” phenotype (Fig. 2.5.2).

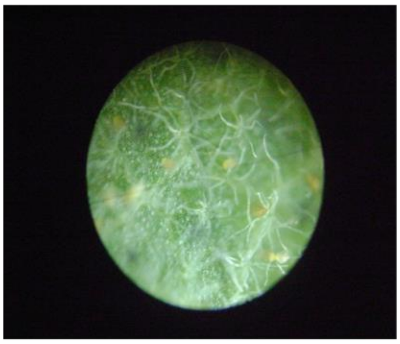
Lines participating in the hybrid combinations “Burama” x “Burama”, which gave separation in F 2 - T-26, T-5/8, T-21/24, T-25/27 indistinguishable alleles of genes that control the type of pubescence at the level leaves Due to the fact that they differ from each other, F 1 plants obtained in their presence have HA and Differentiation at the HD loci , since these plants were diheterozygous $H_A h_A HD h_D$, it was possible to show the division of the population into 15 “twisted” and 1 “normal” type in F_2 (Table 2.5.3).

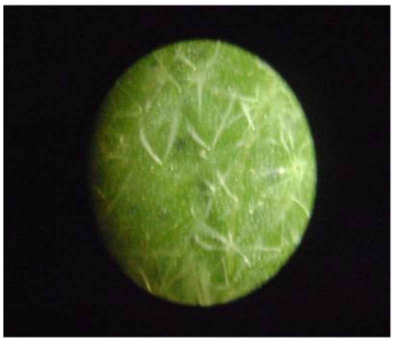
F 1 and F 2 plants , their genotypes and phenotypes.

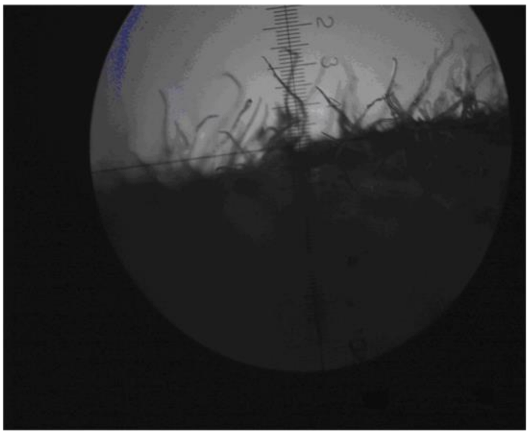
can be written as:

Расм -2

P Т-5/8, Т-21/24, Т-25/27 Т-26

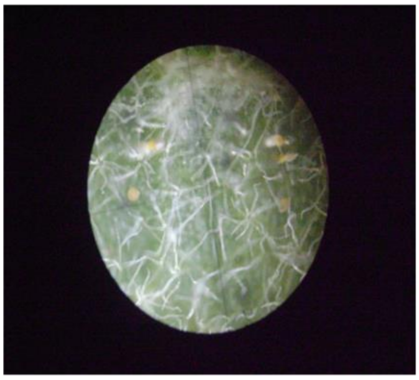




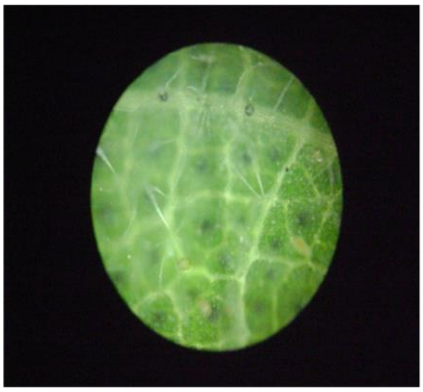


F₁

F₂ "Бурама"



15 бурама



1 оддий

Table 2.5.3

"Twisting" and "curling" of ridges in F_2 plants . on a sheet plate

hair type heredity

№	Parent form and F_2	n	twisted	Simp le	Theoretical expected ratios	χ^2	P
1	T-5/8 x T-21/24	145	145	-	-	-	-
2	T-26 xT-5/8	134	134	-	-	-	-
3	T-5/8 x T-25/27	131	131	-	-	-	-
4	T-25/27 x T-5/8	152	152	-	-	-	-
5	T-5/8 x T-26	124	114	10	15:1	0,70	0,50-0,20
6	T-26 x T-5/8	119	110	9	15:1	0,22	-0,50
7	T-21/24xT-25/27	121	121	-	-	-	-
8	T-25/27xT-21/24	128	128	-	-	-	-
9	T-21/24 x T-26	115	106	9	15:1	0,49	0,50
10	T-26 x T-21/24	158	147	11	15:1	0,14	0,70-0,50
11	T-25/27 x T-26	136	126	10	15:1	0,28	0,70-0,50
12	T-26 x T-25/27	122	113	9	15:1	0,26	0,70-0,50

P T-5/8, T-21/24, T-25/27 (twist) x T-26 (twist)

$H^{S}{}_{A}H^{S}{}_{A}h^{s}{}_{D}h^{s}{}_{D}$ x $h^{s}{}_{A}h^{s}{}_{A}H^{S}{}_{D}H^{S}{}_{D}$

F1_ _ $H^{S}{}_{A}h^{s}{}_{A}H^{s}{}_{D}h^{s}{}_{D}$ - twist

Genotypic class Phenotypic class

	Genotypic class	Phenotypic class	
F2_ _	1. $X^{S}{}_{A}X^{S}{}_{A}X^{S}{}_{D}X^{S}{}_{D}$ - 1	turn 1	15 turn
	2. $H^{S}{}_{A}H^{S}{}_{A}H^{S}{}_{D}h^{s}{}_{D}$ – 2	twists 2	
	3. $X^{C}{}_{A}x^{s}{}_{A}X^{C}{}_{D}X^{S}{}_{D}$ - 2	turn 2	
	4. $X^{C}{}_{A}h^{s}{}_{A}H^{S}{}_{D}h^{s}{}_{D}$ - 4	turn 4	
	5. $X^{CA}{}_{X}C^{A}{}_{h}{}^{s}D_{h}s_{D}$ – 1	twist 1	
	6. $H^{S}{}_{A}h^{s}{}_{A}h^{s}{}_{D}h^{s}{}_{D}$ – 2	twists 2	
	7. $h^{s}{}_{A}h^{s}{}_{A}H^{S}{}_{D}H^{S}{}_{D}$ - 1	turn 1	
	8. $h^{s}{}_{A}h^{s}{}_{A}H^{S}{}_{D}h^{s}{}_{D}$ - 2	twist 2	
	9. $h^{s}{}_{A}h^{s}{}_{A}h^{s}{}_{D}h^{s}{}_{D}$ - 1	simple 1	1 it's easy

Based on the data obtained, we can conclude that the “twisted” type of hair growth manifests itself in the heterozygous and dominant-homozygous state of the gene. There was no intermediate inheritance for this trait.

F_2 monozygous or diheterozygous, separation was observed in phenotypic ratios of 3:1 or 15:1, 1:2:1 and 1:2:2:4:1:2:1:2:1. by genotypes. Moreover, in the “Burama” x “Burama” combinations, the hairs at the leaf level in F_1 plants were in the "Burama" phenotype, and in F_2, in some combinations, all plants had barama. The observation of a 15:1 split as opposed to a 3:1 split in Twisted x Normal F_2 was confirmed, indicating differences in combs with dominant alleles of hair type genes.

We have seen that the curled-simple hair type analyzed above manifests itself in phenotype, and this phenotypic diversity is determined by the states of two non-allelic genes. These phenotypes represent a qualitative genetic analysis of the trait.

2.6. Variability in the number of hairs at the level of 1 mm ^{2} of the leaf blade in F $_2$ and the heritability index.

^{2} leaf blades as a quantitative trait, then the parental lines differed from each other in the trait.

L-001 was found to have an average hair count of 9.3 with a very high variation rate of 27.59% and a normal hair type phenotype.

In the remaining ridges, the type of hair growth is in the “twisted” phenotype, and the number of levels of 1 mm ^{2} is as follows: on average 20.8 units. for T-26, 38 units. at T-5/8. , 47 units for T-21/24, 40 units. for T-25/27, 3 units, variability index is 10.43; 9.16; 7.72; 10.09 is quite low.

It can be seen that the combs of the “twisted” type with the number of bristles at the level of 1 mm ^{2} differ sharply from the comb of the “normal” type L-001.

F_2 by the number of hairs in reciprocal hybrids previously obtained with the L-001 line, our analysis showed that in all hybrid reciprocal combinations the reciprocal difference in F_2 was not significant, only L-001 and $_T$ -5/8 and the difference is significant in combinations L-001 and T-25/27. In other combinations, this difference is not very significant, which means that nuclear genes are primarily responsible for the inheritance of this trait.

If we control the distribution of F2 plants by the number of hairs in the variation series, we will know that the L-001 indicator disappears in F_2 plants . The main reason for this is the small number of studied plants in F_2, and it is more correct to think that plants of a simple type of fertilization make up a small number of plants in F_2.

T-5/8 leaf comb in combinations participating in the role of the mother.

1 mm2 turned out to be 31.5-43.6 (32.7-45.8 for reciprocal combinations, variability 8.90-18.43). The index of variability in the number of hairs at the level of 1 mm $^{2\ leaves}$ was 9.23-13.48%. Plants of these combinations were located predominantly on the right side of the variation line, and a high level of pubescence was noted (Table 2.6.1).

In the second generation of hybrid combinations obtained as the maternal comb T-21/24, the number of hairs at the level of 1 mm ^{2} leaves is the highest - 39.3-47.7 (37.3-44.3 units for reciprocal combinations, variability 8 ,65). -11.58), the variability of the trait was 6.67-12.81%.

, the number of hairs at the level of 1 mm of 2 sheets was 28.2-44.3 pieces (according to reverse combinations

Variability 30.6-47.7 units. amounted to 6.67-12.47%). It is noted that the coefficient of sign variation for these combinations is 9.71-14.22%.

Table 2.6.1

Variability and degree of heritability of the number of hairs at the level of 1 mm ^{2} of the leaf blade of plants F_2, units/mm ^{2}

T/p	Parent forms and F_2	n	M±m	σ	V%	h^2
1.	Л-001	20	9,3±0,57	2,55	27,59	
2.	T-5/8	20	38,0±0,77	3,48	9,16	
3.	T-21/24	20	47,0±0,81	3,63	7,72	
4.	T-25/27	20	40,3±0,91	4,06	10,09	
5.	T-26	20	20,8±0,48	2,16	10,43	
6.	Л-001 x T-5/8	125	32,7±0,54	6,03	18,43	0,86
7.	T-5/8 x Л-001	111	36,5±0,32	3,37	9,23	0,66
8.	Л-001 x T-21/24	116	43,6±0,35	3,77	8,65	0,77
9.	T-21/24 x Л-001	118	42,3±0,50	5,42	12,81	0,88
10.	Л-001 x T-25/27	118	38,7±0,41	4,45	11,49	0,76
11.	T-25/27 x Л-001	110	28,2±0,37	3,40	13,87	0,72
12.	Л-001 x T-26	120	22,0±0,32	3,46	15,70	0,68
13.	T-26 x Л-001	133	20,5±0,32	3,73	18,18	0,67
14.	T-5/8 x T-21/24	145	43,6±0,37	4,44	10,19	0,82
15.	T-21/24 x T-5/8	134	45,8±0,35	4,07	8,90	0,78
16.	T-5/8 x T-25/27	131	41,2±0,40	4,62	11,20	0,82
17.	T-25/27 x T-5/8	152	39,2±0,31	3,81	9,71	0,78
18.	T-5/8 x T-26	124	31,5±0,38	4,25	13,48	0,73
19.	T-26 x T-5/8	119	33,8±0,37	3,99	11,83	0,73
20.	T-21/24xT-25/27	121	47,7±0,29	3,18	6,67	0,75
21.	T-25/27xT-21/24	128	44,3±0,40	4,48	10,10	0,82
22.	T-21/24 x T-26	115	39,3±0,41	4,41	11,21	0,78
23.	T-26 x T-21/24	158	37,3±0,34	4,32	11,58	0,77
24.	T-25/27 x T-26	136	33,5±0,41	4,77	14,22	0,71
25.	T-26 x T-25/27	122	30,6±0,35	3,82	12,47	0,67

The number of hairs at the level of 1 mm ^{2} leaves in combinations in which the T-26 ridge participated as the mother comb was 20.5-37.3 (in reciprocal combinations 22.0-39.3, variability 11.21-15.70 %). The variability of traits in these hybrids was 11.58-18.18%.

Analysis of the tabular data shows that the number of hairs per 1 mm ^{2} leaves in F 2 plants , where separation is observed, has changed slightly compared to the first generation hybrids. However , it was possible to separate from them several dense hairy (50-54 pcs./cm2) transgressive plants. T-21/24, T-25/27 series L-001 x T-21/24, T-21/24 x L-001, L-001 x T-25/27 and "Burama" x "Burama" participated » in $_{G'2}$ T-5/8 x T-21/24, T-21/24 x T-5/8, T-21/24 x T-25/27, T-25/27 x T-B in combinations 21/24, F equals $_2$, positive transgressive variability was observed in comparison with the parent plant and plants belonging to the class 45-54 were isolated.

In the combinations "Burama" x "Burama" the type of leaf pubescence is "Burama" in plants G'1 $_{and}$ "Burama" in some plants of the combination G'2 $_{:}$ in this case, a division into "Normal" types of pubescence is observed. , the variability in the number of hairs is higher, and in the parent with a smaller number of hairs in the variation series, a shift of the ridge to the side is observed.

The degree of heritability of the trait is quite high (0.66-0.88), which indicates its high balance and preservation as a result of selection.

If you carefully monitor the range of variability, then the variation series formed in all hybrid combinations is single-vertex, which indicates the incomplete dominance of a high number of hairs at the level of 1 mm $^{2.}$

Further evidence that this trait is controlled by nuclear genes is the h ^{2} value , which indicates that the trait is genotypical in 0.66-0.88% of the population and there is a high probability of distinguishing densely pubescent forms on the leaf in future generations. .

Genetic analysis of the number of hairs per 1 mm $^{2\ level\ in}$ convoluted ridges indicates that polygenes do participate in its genetic control, and the absence of significant transgressive variability in plants of F $_2$ reciprocal hybrids of these ridges indicates their similarity in terms of the main genes, but may differ slightly in modifier genes .

2.7. Correlation of economic traits and traits of pest resistance in cotton hybrids

A significant and strong inverse (r=-0.76) correlation was found between the average number of pests on 3-4 leaves and the number of hairs per 1 mm2 of leaves. This confirms the strong correlation between hairiness and durability reported in most of the literature. It was also established that there is a weak (r=-0.23) inverse relationship between the average number of spider mites on 3-4 leaves and the total thickness of the leaf blade.

It was established that there is a correct positive correlation between the number of hairs per 1 mm^2 leaf and the total leaf thickness of F_2 hybrids according to B. Dospehov's method.

In parental forms this indicator was 0.33-0.62, and in hybrids this indicator was from moderately positive to strongly positive and 0,97 raequaled 0.37. This situation, that is, the presence of a correct correlation between pubescence and leaf thickness, indicates that leaf thickness can also be high due to the density of pubescence (Table 2.7.1).

Table 2.7.1

plants F_2

T/r	Parent forms and hybrids	p^2	tr_ _
1 .	L-001	0.57	2.9
2 .	T-5/8	0.33	1.4
3 .	T-21/24	0.51	2.5
4 .	T-25/27	0.57	2.9
5 .	T-26	0.62	3.4
6 .	L-001 x T-5/8	0.97	3.2
7 .	L-001 x T-21/24	0.44	3.4
8 .	L-001 x T-25/27	0.55	4.5

9 .	L-001 x T-26	0.41	3.1
10 .	T-5/8 x L-001	0.60	5.3
11 .	T-5/8 x T-21/24	0.43	3.3
12 .	T-5/8 x T-25/27	0.53	4.3
13 .	T-5/8 x T-26	0.37	2.7
14 .	T-21/24 x L-001	0.61	5.4
15 .	T-21/24 x T-5/8	0.70	6.8
16 .	T-21/24xT-25/27	0.37	2.8
17 .	T-21/24 x T-26	0.60	5.2
18 .	T-25/27 x L-001	0.61	5.3
19 .	T-25/27 x T-5/8	0.62	5.5
20 .	T-25/27xT-21/24	0.40	3.0
21 .	T-25/27 x T-26	0.47	3.7
22 .	T-26 x L-001	0.50	4.0
23 .	T-26 x T-5/8	0.50	4.0
24 .	T-26 x T-21/24	0.40	3.0
25 .	T-26 x T-25/27	0.47	3.8

$P \leq 0.05$

Based on the data presented, we can conclude that there are positive relationships between the traits that ensure tolerance, and in this regard, breeding work is highly effective.

Based on many years of scientific research, we have come to the following conclusions:

- F_1 thickness of the leaf blade, number of hairs per 1 mm ^{2} leaves were inherited in the intermediate state, and the reciprocal effect was significant. The “rolled” type of leaf surface hairiness was completely dominant, and in the heterozygous state it exhibited a “rolled” phenotype.
- As a result of genetic analysis, it was proven that the type of hairiness at the leaf level in cotton is inherited through the interaction of two non-allelic genes. These genes, in our opinion, belong to two groups of the genome, which we designated as $^{HS}{}_{A}$ - h $^{s}{}_{A}$ and HS ^{D} - h $^{s}{}_{D}$. The genetically analyzed combs were characterized in the following

genotypes by hair type. L-001– $h^{s}_{A} h^{s}_{A} h^{s}_{D} h^{s}_{D}$ – normal, T-5/8, T-21/24, T-25/27- $H^{S}_{A} H^{S}_{A} h^{s}_{D} h^{s}_{D}$, T-26 – $h^{s}_{A} h^{s}_{A} H^{S}_{D} H^{S}_{D}$ - don't cool it.

- In the literature reviewed, a moderate to strong positive correlation was noted between leaf thickness and hair count.

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