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ҚАЗАҚСТАНДАҒЫ ҚЫТАЙ БҰРШАҒЫНЫҢ КАРАНТИНДІ АУРУЛАРЫ

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Аңдатпа

Қытай бұршағы өте құнды бұршақ дақылдары қатарына жатады және қолдануы бойынша әрі азықтық, техникалық, медициналық мақсаттарда кең жағдайда пайдалынатын әмбебаб өнім. Қазақстанда осы дақыл 1980 жылдан бастап егіледі және осы дақылдың өсіп дамуына Алматы, Жамбыл облыстарының ауа-райы қолайлы болып табылады. Бірақ оның өнімі елімізде өте төмен. Қытай бұршағының өнімділігіне бірнеше факторладың әсері бар. Осы дақылдың өніміне қытай бұршағы егісінде кең тараған арулардың маңызы зор.

Негізінен қытай бұршағын бактериялар, вирустар және саңырауқұлақтар зақымдайды. Әсіресе саңырауқұлақтар ауруларының әсері зор болып келеді. Алғаш рет Қазақстанның оңтүстік-шығысында осы дақылдың карантинді саңырауқұлақ ауруларының бірнеше түрлерінің белгілері анықталды. Алматы және Жамбыл облыстарының егіс алқаптарына карантин аруларын анықтау үшін мониторинг жүргізілді, осы ауруларды анықтау үшін микробиологиялық, фитопатологиялық әдістемелер арқылы талдау жасалынды. Мониторинг жүргізген жылдары тексерген карантин ауруларының Алматы облысында қытай бұршағы егістерінде таралуы орташа дәрежеде болса, ал Жамбыл облысында аталмыш карантинді аурулар кездеспеді. Қытай бұрашығында карантин ауруларының Қазақстанда төрт түрі, атап айтқанда рак ауруы (Diaporthe phaseolorum), сабақ шірігі (Phomopsis sojae Leh), теңбіл церкоспорозы (Cercospora kikuchii M.Mats.), фитофтороз (Phytophthora sojae Kaufm.) ауруларының кездесетіні көрсетілген. Осы дақыл егісінде кездесетін карантин ауруларының симптомдары, таралуы, зияндылығы және қоздырғыштарының биологиялық ерекшелері зерттеліп құнды мәлеметтер алаынды.

Алматы облысы Талғар, Қарасай, Енбекшіқазақ, Сарқанд, Жамбыл аудандары аймақтарында орналасқан шаруашылықтарында карантин ауруларының таралуы 1,5 тен 25,7 пайызға дейін жеткен. Ал қытай бұршағында Diaporta M. және Phomopsis L. туыстарына жататын саңырауқұлақтар қоздыратын карантин ауруларының қытай бұршағы егістерінде кейбір танаптарда таралуы айтарлықтай жағдайда болды (30 пайызға дейіе жетті). Қазақтың ҒЗИ эксперементалдық базасында қытай бұршағының Мицуля сортында теңбілді церкоспороз және фитофтороз карантинды ауруларының бірлі – жарымды белгілері кездесті. Карантинді аурулардың қоздырғыштарының морфологиялық және культуралды белгілері мақалада келтірілген. Аталған карантин ауруларымен агротехникалық және химиялық күрөсу жолдары келтірілген. Карантинді аурулардың негізгі инфекциялық көздері болып осы дақылдың тұқымы мен өсімдік қалдықтары болып табылады.

Негізінен карантинді ауру тұқым арқылы таралады, сол үшін қытай бұршағы егілген бұрынғы орнына 2-3 жылдан кейін егу, яғни ауыспалы егісін сақтау керек, өсімдіктің карантин ауруларына төзімділі.ін арттыру үшін минералды және

микроэлементтерді (молибден) тиімді дозаларын қолдану, қытай бұршағы дақылына қолайлы және тиімді алғы дақыл ретінде күздік бидайдан кейін егу тімді болады, өсімдіктің залалданған қалдықтарынан тазарту үшін карантин ауруларының қоздырғыштарының инфекциялық көздерін жою үшін күздүгүні топырақты 25-30см тереңдікте сүдігер жырту, тұқымды сау өсімдіктен жинап, іріктеп, себер алдында тұқымды химялық препараттар ТМТД-і (4кг/т), тачигарэн(6кг/т), фуназол (3кг/т) және деразол (3л/т) дәрілеу өте тиімді,, ал теңбіл церкоспороз және фитофтороз ауруларының вегетация кезеңінде алғашқы белгілері біліне бастағанда контактілік және жүйелі фунгициттерді бүрку керек.

Түйін сөздер: *соя, қатерлі ісік, бұршақтар мен сабақтарды күйігі, тұқымдар шірігі, күлгін церкоспораның ауруы, шірік, патоген, инфекция көзі, таралуы, бақылау шаралары.*

КАРАНТИННЫЕ БОЛЕЗНИ СОИ В КАЗАХСТАНЕ

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Аннотация

В статье приведены результаты изучения карантинных болезней сои в Казахстане. Приведены распространенность и вредоносность пяти карантинных болезней, встречающихся на посевах сои в условиях Алматинской области. Изучены биологические особенности возбудителей болезней рака, ожога бобов и стеблей, гнилей семян, пурпурного церкоспороза и фитофтороза. Наиболее потенциально опасным карантинным заболеванием является рак сои возбудитель Dioporta phascolarum. Оно широко распространено во всем мире, где возделывается эта культура. Описаны симптомы проявления болезни. Гриб на пораженных частях растений в наших условиях не образует пикниды. Пораженные растения гниют отстают в росте и засыхают. Снижается урожай сои до 50%. В чистой культуре гриб уплотняется, образует тяжи. Оптимальная температура для роста гриба является 20-27^0 С, минимальной- свыше 5^0 С, а при 35^0 С мицелий гриба не растет. Инкубационный период болезни составляет 25-35 дней. Основными источниками инфекции служат пораженные семена и растительные остатки. Впервые болезнь в республике был зарегистрирован в 1983 году ПК «Социализм» Енбекшиказахского района Алматинской области. Распространенность болезни в условиях Алматинской области составляет от 0,5 до 5,7%. Однако во влажные годы при частых осадках наблюдается интенсивное развитие болезни, где пораженность растений доходит до 30%.

В республике также зарегистрирован ожог бобов и стеблей, в 2001 году в соесеющих хозяйствах ПК «Аиыр-Шыр», имени Д.А. Кунаева и на посевах сои экспериментальной базе Каз НИИ земледелия и растениеводства. Болезнь имеет симптомы сходные с выше указанным заболеванием сои. Она вызывает гниль семян, поражение семядолей, черешков, стеблей. На указанных органах растений образуются бурые красновато-коричневые пятна. В отличие от возбудителя диоптория, при поражении растений ожогом бобов образуются многочисленные пикниды. Распространение гриба происходит пикнидами при дождливой погоде.

Пикниды шаровидной формы, однокамерные с размером 112-542х 98-585 мкм. Источником инфекции заболевания также являются пораженные семена и растительные остатки. Возбудителем заболевания является-несовершенный гриб Phomopsis sojae из порядка Sphaerapsidales. Болезнь относится к карантинным объектам и характеризуется вредоносностью. Она поражает семядоли, черешки, стебли и листья растений. Особенно вредоносным считается поражение бобов. Пораженные семена теряет всхожесть. Гриб сохраняется при хранении в лабораторных условиях на семенах до двух лет. Позднее на пораженных местах образуются пикниды с пикноспорами.

Основными мерами вышеуказанными карантинными болезнями являются соблюдение правильного севооборота с возвращением культуры на поле не ранее через 2-3 года. Необходимо возделывать после озимой пшеницы, внесение оптимальных доз основных удобрений и микроэлементов (молибден), а также протравливание семян сои ТМТД в норме 4-6 кг/т, фундазолом 3 кг/т, тачигареном 6 кг/т и дерозолом 3 л/т.

Гниль семян сои также является особо опасным карантинным заболеванием. Оно впервые в республику было завезена семенами из Голландии сортом Тажин. В настоящее время оно распространена во многих соесеющих хозяйствах юго-востока Казахстана. Коммерческие сорта и гибриды сои сильно поражаются гнилью семян.

В Казахстане также отмечено карантинные заболевания пурпурный церкоспороз и фитофтороз. Возбудителем церкоспороза является Cercospora kikuchii, а фитофтороза- узко специализированный гриб Phytophthora sojae. Эти карантинные болезни сои в республике пока встречаются очагами и являются потенциально вредоносными болезнями. Кроме того, эти болезни широко распространены и вредоносны в России. Меры борьбы с этими болезнями являются соблюдение севооборотов, зяблевая вспашка на глубину 25-30 см. протравливание семян и обработка посевов сои контактными и системными фунгицидами.

Ключевые слова: *соя, рак, ожог бобов и стеблей, гниль семян, пурпурная гниль церкоспоры, поздняя гниль, возбудитель, источники инфекции, распространенность, меры контроля.*

QUARANTINE SOY DISEASES IN KAZAKHSTAN

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Abstract

The plant protection system is the most common chemical method. The use of chemical methods of plant protection products contributes to a significant increase in crop yields and productivity in agricultural production. The essence of the chemical method of plant protection is the use of chemical compounds, poisons against pathogens of plants and pests. In plant protection, the chemical method is mainly used for prevention, chemicals are used to treat the outer side of the plants and thereby achieve external pest protection. The article presents the results of a study of quarantine soy diseases in Kazakhstan. Potentially hazardous ones of the most economic importance at present for the republic are indicated. Shows symptoms of quarantine soybean diseases, biological characteristics, prevalence and severity of quarantine soybean diseases. The conditions conducive to the

causative agents of some quarantine diseases of soy are shown, as well as measures to combat them are shown.

Keywords: Soybean, cancer, burn the beans and stems, seeds rot, purple cercospora blight, late blight, the pathogen, the sources of infection, prevalence, control measures.

Among of legumes grown in Kazakhstan, soybean is considered a relatively new crop. It is a valuable high-protein and oilseed crop, widely used in food, feed, technical purposes and in medicine [1]. The main value of soybean in its richness in proteins and fats [2]. On average, soybean contains 50% protein and 20% fat. The ability of soybeans to improve the water-physical properties of soils, to fix nitrogen from the air and to absorb hard-to-reach nutrients from deep soil layers makes it a valuable precursor for crops. Soybean is also a valuable feed crop and an important source of digestible protein for all types of farm animals.

Currently, in Kazakhstan, the area under soybean sowing has risen sharply to 150 thousand ha; and in the future it is planned to increase the average of the sown area in the south and southeast of Kazakhstan and advance it to the east (East Kazakhstan region) and west (Aktobe, West Kazakhstan regions) and north (Kostanay, Pavlodar regions) of the country, which is an important stage in the intensification of agricultural production. At the same time, soybean productivity is low and amounts to 15-20 kg / ha. One of the reasons for the loss of productivity is the widespread use of various infectious diseases, including quarantine diseases, in the crops of this crop. The potentially dangerous causative agent of soybean cancer *Diaporthe phaseolorum* in terms of harmfulness, this disease poses a great danger in the co-production of those countries where it is already common. Stem cancer is the most dangerous and quarantine disease. It is widely distributed in many countries of the world where soybean is grown - these are the USA, Canada, Brazil, India, Europe. According to morphological and cultural characteristics of the pathogen, the disease is similar to a burn of stems and beans, but is characterized by extremely rapid development and can cause a decrease in yield from 20 to 50% [3]. In recent years, the disease has been registered in the matrimony of the Independent State countries, in the Krasnodar Territory, Abkhazia, and Moldova.

Symptoms of the disease appear in the seedling phase on the cotyledons, stems and roots of the shoots in the form of small red-brown spots and ulcers, which develops gradually throughout the growing season, and subsequently spreads along the stem. Growing in size, spots ring the soybean stems, causing wilting, drying out and death of the affected plants. With the development of plants in the lower part of the stem at a height of not less than the eighth node, red-brown ulcers form that covers the stem. The fungus that causes stem cancer does not form picnids on infected plants, while wintering in organic debris, and torrential rains spread conidia to soybean plants. The cross-sectional view of the stem core noticeable is darkening. Affected plants lag behind in growth, they wither and dry. The stems of dried plants break easily.

Spotting of beans and stems appears in the second half of the growing season. First, the disease manifests itself on the petioles of the lower leaves and on the lower nodes, in which black stripes appear. Beans are also affected. The leaves dry out, but do not fall. Affected stems dry out slowly. In diseased plants, beans ripen faster. Often, affected plants do not form beans. With a severe defeat, the beans dry out, crack and fall off.

Heavily affected seeds are wrinkled, with brown-violet spots, and are often covered with white bloom, while slightly affected seeds do not differ in appearance and form from healthy ones. In wet weather, the affected seeds are moldy, rot, lose their germination and nutritional qualities. Plants with mechanical damage are more susceptible to disease.

Isolates of the disease were isolated from the affected plants and seeds into a pure culture, where the fungus forms grayish-white colonies with poorly developed aerial mycelium on nutrient media. Then the fungal colonies are compacted, forming strands. Good growth in a pure mushroom culture is observed at a temperature of 20-270 C. At a temperature of 3-50 C and above 350 C, the growth of the mycelium of the fungus stops.

In 1993 the farm "Socialism" Enbekshikazakh district soya plants were found with the characteristics of cancer stem manifestations. Further examination of the crops revealed foci of disease in the contiguous farms of the Talgar and Kaskelen districts of the Almaty region. At the farm to them. P.F. Tomarovsky on soybean and cultivar plot of the Kazakh Research Institute of Agriculture and Plant Growing the number of affected plants ranged from 0.5 to 5.7%. With the early onset of the disease, the number of beans and the weight of seeds from one plant on diseased plants decreased by 10-12 pieces, and by 4.5-6.7 gr. respectively. The mass of 1000 seeds per 10.2-22 g. lower than from healthy plants. In seed lots taken from infected plants, there are over 23.2% of infected seeds. A decrease in grain yield from diseased plants, depending on the intensity of the development of the disease, was recorded in the range of 10.5-22.9%.

The spread and development of the disease is facilitated by the cultivation of soybeans in a monoculture, cultivation of susceptible varieties (Hybrid 670, Eureka, Kazakhstan 200), thickened crops, as well as weather conditions of the year, where the intensity of the development of the disease correlates with the number of rainy days, with the frequency and amount of rainfall during the summer.

The harm of the disease consists in reducing the number of beans up to 40%, the mass of seeds from one plant to 50 seeds and a mass of 1000 - up to 15%, reducing seed germination to 12%. With severe damage to soybean, the oil content in the seeds decreases to 2.5%. The most harmful disease is soy in the phase of the formation of beans. Shortage of soybean seed yield depends on the time of manifestation of the disease. Sometimes they reach up to 50%. Seeds from affected beans often do not germinate.

The source of primary infection for soybeans are seeds and plant debris on which pathogens are stored and infected seeds in which the mycelium is stored.

On the affected residues after overwintering, the fungi sexually form a marsupial stage in the form of spherical peripheries, which form in the stroma in groups from 2 to 12, on average 3-5, in the middle of which bags with bag-spores form. Clubs are club-shaped, with eight bag spores. The latter are bicellular, colorless, and elliptical. Ascospores are ejected in May - June at high relative humidity. When storing seeds in laboratory conditions for 2-3 years, the fungus does not lose viability.

Mushrooms are demanding of high humidity and temperature, the optimum is about 25 ° C. The intensive development of the disease is observed in soybean crops, which are placed on fields rich in organic matter. The incubation development of the disease lasts 25-35 days.

The most intense disease damage to soybean is observed with frequent precipitation of the spring-summer period. If stalk cancer is detected on plants, quarantine measures are necessary.

A burn of beans and stems or phomopsis. The disease is common everywhere soybeans are grown. A burn of beans and stems is also a dangerous disease of this crop.

The disease has symptoms similar to stem cancer. This disease is widespread in the main areas of soybean cultivation: in Brazil, Hungary, India, China, France, Japan and others. In the Commonwealth of Independent States countries, [5] is noted in the Caucasus, Moscow region, Moldova, Krasnodar Territory.

The fungus causes seed rot, damage to the cotyledons, petioles, stems, less often leaves in the form of brown or reddish-brown spots. Usually, the disease begins to appear on the petioles of the lower leaves during warm, humid weather in the middle of the growing season (in the phase of the formation of beans). By the time of soybean ripening, numerous picnids are formed in the affected areas, which are usually located in rows or are only in spots, usually near internodes. In rainy seasons, the picnids are randomly distributed over the entire surface of the affected tissue, and in dry weather it is localized on the stem closer to the soil.

On the dying tissues of the bean cusps, the picnids are arranged in rows or randomly. The most harmful bean defeat. With early infection, they fall off, and at a later date, the beans and seeds dry out and crack, partially or completely covered with white mycelium. Severely affected seeds lose their germination capacity, have a lower mass and size, and the worst quality oil and flour can be obtained from them.

A burn of beans and stems is a slowly developing disease. Anamorphic stage of development of the pathogen *Phomopsis sojae Leh*. Hornbeam propagation occurs by *pycnospores*, which are formed in large quantities in picnids immersed in an open or slightly expressed stroma. The pycnids are spherical in shape, single-chamber, sometimes multi-chamber (the camera seems to have a hole on the apex), black 112-542 x 98-385 microns in size with a very short, spout-like, often absent stomata. *Pycnospores* of two types: colorless, often fusiform, unicellular, containing two drops of oil, 4.9–9.8 x 1.7–3.2 μm in size and rarely encountered filiform, hooked concave conidia 14.1–35.1 x in size 1.2-1.7 microns.

On overwintered stems, rounded fruiting bodies of fungus *perithecus* are formed. Mature *perithets* have the shape of an irregular sphere, are slightly flattened at the base, are formed singly in the black stroma and have a conical spout (proboscis) 1.5 mm long and 60-142 microns wide at the base. The size of *perithecia* is 48-282 x 185-346 microns. As keys are sessile, elongated, club-shaped, eight-spore, size 35-51 x 3.3-10 microns. *Ascospores* are colorless, elongated elliptical, with one septum, with rounded ends, measuring 9-13 x 2-6 microns, contain two drops of oil in each cell. The teleomorphic stage of development of the fungus is rare.

The source of the spread of the disease is a fungus that persists in the affected seeds and plant debris. Its viability is maintained when storing seeds for two years in a cool, dry place.

The disease was first detected in 2001 in Kazakhstan when examining soybean crops in Almaty oblast, Ayyr-Shir PC, named after D.A. Kunaev and at the experimental base of the Kazakh Research Institute of Agriculture and Plant Growing were found plants with the symptoms of this disease, where in these sowing farms were used seed materials brought from the Netherlands variety Tazhin affected by phoopsisis. Through laboratory studies, the causative agent of the disease, the imperfect fungus *Phomopsis sojae Lehm*, was established. From the order of *Sphaeropsidales*. Phyto-examination of soybean seed material carried out in 2001-2003. Also revealed some seeds infected with phomopsis imported from the countries of the Netherlands, Russia and France (varieties Tazhin, SibNIIISKH-1, Decabit). The causative agent of burns of beans and soybean stems, *Phomopsis sojae* is classified as a quarantine object and is highly harmful.

The fungus causes seed rot, damage to the cotyledons, petioles, stems, less often - leaves in the form of brown or reddish-brown spots. The size of the spots and its color vary. Infected seeds produce sprouted seedlings; small reddish-brown spots form on the affected cotyledon leaflets. Usually in the field, the disease begins to appear on the petioles of the lower leaves in warm, humid weather in the middle of the growing season, the phase

of the formation of beans. Spreading further along the stem, the fungus rings it, causing wilting, drying out and death of the affected plants. With a cross section of the stems, a darkening of the core is noticeable.

The most harmful is the defeat of the beans. Typically, a burn of beans and stems does not appear externally in young green beans, initially localized in the lower part of the plant, then, in humid conditions, the fungus penetrates the seeds. With an early defeat, the beans fall off, and with a later one, the affected beans and seeds dry out and crack, partially or completely covered with a white coating. Heavily infected seeds lose their germination capacity, are smaller in mass and size, and they produce the worst quality oil. Currently, in many contemplating countries, the burn of beans and soybean stems is considered the main cause of the appearance of moldy and poorly germinating seeds. The causative agent of infection is usually localized in the lower part of the stem in the first eight internodes. The viability of the fungus is preserved during storage of seeds for two years in dry, cool conditions.

In places of lesions forms pycnidia with pycnospores. Broad-base picnids, almost spherical, 112-582x98-385 microns in size. The pycnospores are colorless, unicellular, fusiform, 4.9-9.8X X 1.8-3.2 microns, sometimes almost filiform, 14.1-35.1 X 1.2-1.7 microns.

The causative agent of burns of beans and stems is capable of affecting sixteen types of leguminous plants, as well as potatoes, *Theophrastus cordata*, garlic, onions, peppers, tomatoes, etc.

The optimal factors for the development of the pathogen of burns of beans and stems in the field are high relative humidity (over 90%) and a temperature of 25-270C. The most severe burn of beans and stalks of soybean develop when heavy precipitation occurs, it grows in the foothills of the Almaty and Zhambyl regions.

The source of infection of the disease is a fungus that persists in the affected seeds and plant debris.

The most important measures to prevent the spread and development of a burn of beans and stems are as follows:

- compliance with the correct crop rotation (change of plots) with the return of soybeans to the field no earlier than 2-3 years and the alternation of unaffected crops so that infected plant debris does not accumulate in the soil. The best precursor for soybean is winter wheat.

- Timely introduction of optimal norms of basic fertilizers and microelements. Molybdenum is particularly beneficial for soybean plants.

- a preliminary assessment of seed infection with fungal infection and their treatment with fungicides: TMTD, vsk 4-6 kg / t, foundationazole, 50% cn 3 kg / t, tachigaren, 70% cn 6kg / t, derosal 3l / t.

- The cultivation and cultivation of soybean varieties resistant to phomopsis.

- Imported foreign soybean varieties should be subject to quarantine control and subsequent laboratory examination.

Rot of soybean seeds is a particularly dangerous quarantine disease. The pathogen of soybean seed rot is *Phomopsis longicolla*. The area of this disease corresponds to its range the most soy culture. However, the degree of damage to the soybean seed rot and damage caused by this disease is not the same. At present, soybean seed rot has a pathogen fungus from the genus *Phomopsis sp*., which, according to American experts, plays a major role in seed rot. The causative agent does not appear in young green beans, but is initially localized in the lower part of the plant. Later, in humid conditions, the fungus introduces into the seeds. In 1985, this fungus was identified as Phomopsis longicolla Hobbs, sp. now.

It differs in cultural - morphological characteristics from the causative agent of burn beans and stems.

The disease was first brought to Kazakhstan from the Netherlands by seeds of the Tazhin variety. Unlike soybean of *fusarium*, the manifestation of seed rot in all areas of the republic's sowing is mainly sporadic, and in European countries this disease is observed quite often, causing massive damage to soybeans in large areas. In France, a similar picture is observed annually. Significantly loss of soybean crop in Brazil, Serbia, India, Hungary, China and Japan.

In Kazakhstan, the disease is spreading in the Aiyr-Shir farmstead in the Talgar region, on the experimental base of the Kazakh Scientific Research Institute of Agriculture and Plant Growing in Karasai district, the Arna farmstead in the Saraknd district, Baltabay farmstead, Enbekshikazakhsky farmstead, Svetlana farmstead and Zhaisan farmstead Zhambyl districts of Almaty and in the RK "Stepnoye" of the Kurdai district of the Zhambyl regions, and it ranges from 1.5 to 25.7%.

The main signs of rotting soybean seeds are shriveled, cracked, elongated seeds with a white, chalky surface. However, sometimes the seeds may not have visible symptoms. Infection begins during the maturation of seeds from a previous crop rotation. Infected seeds germinate slowly or not at all. This can significantly reduce the density of plant standing and lead to lower seed yields.

The causative agent of the disease refers to a picnidial fungus with an unknown *teleomorph*. This fungus forms black picnidia, which produce two types of hyaline conidia: ellipsoidal, turning into a spindle-shaped α-conidia, and filamentous β-conidia. Conidia formed on infected crop residues are the main source of pathogen spread. Warm, moist air contributes to the formation of spores, and wind and rain - to the spread of conidia over short distances. Infected seeds allow the pathogen to spread over long distances.

Zoned varieties of domestic and foreign selection, as well as hybrids and numbers that are in a competitive test are not resistant to the above diseases. Only the only French variety Decabit was relatively resistant to the disease.

Purple cercosporosis. Leaf spotting is a cercosporosis disease that is very common in soybeans in the USA, Brazil, China, Japan, India, France, Serbia and other countries. Purple cercosporosis was previously noted only abroad [6]. In Russia, this disease was first detected in the Moscow Region [5], but is of economic importance only in the Far East, where in some years the development on leaves and beans reaches 75-100%, and the number of affected seeds is more than 30%. Seed infection of *cercosporosis* reduces seed germination by 12-55%. The leaf form is especially harmful during early intensive development, while the number of beans decreases by 6 times, and the weight of the seeds is almost 8 times [7, 8]. The causative agent belongs to the class *Deuteromycetes*, the order of *Moniliales* or *Hyphomycetales*, the family *Dematiaceae*. The fungus (Cercosporakikuchii M. Mat.) Is highly specialized, affects only soybean. Possible areas for the spread of the causative agent: the western part of Georgia, wetlands or irrigated areas of the North Caucasus, the Far East, some areas of Moldova, the disease in Ukraine is quarantined, young and adult plants are affected. Given the high pathogenicity of the pathogen of purple *cercosporosis*, it is included as a potentially dangerous pathogen. This disease in Kazakhstan is a quarantine object. Purple *cercosporosis* is widespread in Russia and China, where seeds are intensively exchanged with these countries, which we predispose to appear in our republic.

For the first time the biological features of this fungus are described by A.M. Ovchinnikova [9]. She warned that in connection with the expanded exchange of plant products, including seeds, the most serious attention should be paid to a thorough

examination of the exchange material, timely detection and prevention of the spread of this dangerous disease in soybean crops. The pathogen may be present in the seed coat and cause staining of its entire surface or in the form of dotted spots in pink or purple. Sometimes infected seeds do not have external signs of damage; seedlings developed from them have underdeveloped cotyledons that acquire a purple color and easily fall. The plant is poorly developed and may die.

The disease affects soybean in all phases of growth and manifests itself on seeds, beans, stems and leaves. The infected seeds are partially purple or pink. Spot size and color may vary. Affected seeds give sprouted seedlings; in diseased seedlings, the *cotyledonous* leaves are often wrinkled, sometimes they become dark purple and fall prematurely. Subsequently, the fungus spreads along the stem, forming reddish-purplish non-ramified sections encircling the stem, which leads to the death of young plants. Weakly affected plants lag behind in growth. In adult plants, when the leaves of the stem are damaged, spots of red-brown color with a dark brown rim appear. The leaves prematurely turn yellow and fall, the stalk bends and breaks in the affected areas. On beans, the disease manifests itself in the form of slightly depressed, oval or irregularly shaped reddish-purple spots ranging in length from 1.0 to several centimeters.

The optimal conditions for the development of the causative agent of the disease in the field are high relative humidity (over 90%) and a temperature of 280 ° C. Purple *cercosporosis* develops most rapidly with heavy rainfall, the appearance of fogs or growth, in low places, with delays in soybean harvesting. During plant vegetation, the pathogen is distributed by conidia. The source of infection is the affected seeds, as well as the affected plant debris on which the pathogen is preserved by the mycelium and conidia.

Cotyledon spores spread by wind and rain to leaves and stems. Small purple round or angular spots of irregular shape up to 1.0 cm in diameter develop on the leaves, subsequently merging and acquiring a leathery appearance. Similar spots form on beans. Subsequently, the infection spreads along the stem in the form of encircling reddish-purple non-ramified spots, on young seedlings; the affected tissue is depressed, with a whitish-pink mycelium of the pathogen. During the growing season, the fungus gives many generations of conidia, the formation of which depends on many conditions. The development of the disease contributes to high temperature and humidity.

In Russia, harmfulness, cultural and morphological signs of the causative agent of the disease have been established, and the ways of the spread of infection and the development of the fungus have been clarified, depending on various factors.

The harmfulness of purple *cercosporosis* is to reduce the assimilation surface of plants, which negatively affects the productivity of plants and the sowing qualities of seeds. In infected seeds, field germination is reduced by 6% or more, the height of plants is 22.2 cm, the number of beans is 1.6 and the number of seeds is 2 times. According to S.T. Liu. The number of diseased seeds in China reaches 12-62% [10]. Shortage of soybean seed yield can reach 30% or more. In a humid chamber, tufts of articulated brown conidiophores with conidia are formed on the affected parts of plants and seeds. Conidiophores are gray-brown in color, articulated, and bundled, at the ends of which colorless, elongated, articulated conidia are formed. At the base, they are blunt, pointed at the apex, with numerous partitions. At first, the mycelium is light, and turns brown over time. Conidia are colorless elongated, slightly curved, obtuse at the base, pointed at the apex (38.8-445 x 1.3-6.1 microns) with 2-49 septa (usually 10-20 septa 50-265 x 3.5 microns in size).

On potato-glucose agar, the colonies of *Cercospora kikuchii* are olive-gray in the center and whitish at the edges. The aerial mycelium is dense, with deep folds extending

from the center. On the reverse side, the color of the colonies varies, but most often, dark purple with pink edges.

It was established that when sowing seeds obtained from infected plants without visible signs of damage, the seedling infection was 67.5%, the oil content in the seeds decreased by 2.5%.

The distribution of purple soybean *cercosporosis,* and its biological and morphological features and symptoms of damage in the Primorsky Territory are noted in the monograph by L.A. Degas [11].

Cercosporosis is caused by the fungus *Cercospora kikuchii Hara* (imperfect class, *hyphomycete* order). The fungus infects cotyledons, stems, beans, seeds.

On the cotyledons, brown through ulcers or superficial spots with a dark brown rim are formed, on which a dirty gray coating of conidiophores and conidia is well defined. The conidia are colorless, oblique-clavate or cylindrical, narrowed to the ends, obtuse-end: 55.55 x 6.16 μm with 1-7 septa. When infected with cercosporosis of simple and complex leaves, roundish whitish-gray spots with a pronounced brown rim are formed. A dark gray coating appears on the spots on the underside of the leaves. The shape of conidia is the same as on cotyledons. Their sizes on simple leaves are 64.13x7.92 microns with 2-9 septa. On stems, spots are elongated, violet-red, later darkening, with a grayish center and a brown rim. Sporulation on spots develops extremely poorly. In isolated cases, it was possible to observe conidia with 2-8 septa measuring 49.47x7.44μ. The shape and color of conidia is the same as that of cotyledons and leaves. On green beans, cercosporosis manifests itself in a spotting villa similar to that on leaves. Before soybean ripening, the central part of the spot darkens and becomes grayish-black. On beans, as well as on stems, central sporulation developed very poorly. Size of conidia: 49.64x7.58 microns with 1-11 septa.

Infected seeds are characterized by the formation of two types of spotting. In some cases, the spots are irregularly rounded, convex or superficial with a sharp brown rim. Sporulation occurs only in wet conditions. Conidia are 71.5x7.0 μ in size. In other cases, the formation of convex dark brown spots without a distinct rim with blurry, smudged edges was observed. As in the first case, sporulation is formed only in a moist chamber. The shape and color of conidia is similar to those of the above isolates. Conidia with 3-12 septa, size 81.73 x 7.7 μ. In all cases, at the base of the bundle of brownish-olive unbranched conidiophores, the formation of densely interlaced heavily interwoven stormatic of the mycelium was observed. The fungus is stored in the form of mycelium or conidia in plant debris or in seeds up to two years or more. Wild soybean also serves as a source of infection in the Far East. The infection spreads with the seed and with the help of conidia carried by the wind, drops of water, insects.

Thus, when studying isolates of the causative agent of cercosporosis taken directly from the affected parts of soybean plants, an almost complete analogy of the morphological characters of various sporulation organs was established. There were only some differences in the size of conidia, in particular isolated from seeds.

Cultural and morphological characteristics of 6 isolates isolated from various affected organs, including soy leaves, were studied on potato-glucose agar. It was established that the structure of the colonies was the same and they differed mainly in size and outline of their edges (even or with radiant protrusions).

All isolated isolates were characterized by colorless mycelium, straight unbranched olive conidiophores and the formation of heavily interwoven stromatic of the mycelium. The conidia were colorless, inverted, vascular or elongated celestial, narrowed to the apex, obtuse, with 2–11 septa. An almost complete coincidence of the size of the spores in the

studied isolates was observed. Their length ranged from 41.96 x 2.13 μ to 54.90 x2.32 μ, width - from 6.67 x 0.19 μ to 8.13 x 0.10 μ. Thus, the differences we have established in the morphology of conidia taken directly from the affected organs, when isolates are isolated in a pure culture, is almost completely leveled.

In order to prevent purple cercosporosis, a quarantine disease of soybeans, when seeds are received from abroad at the point of delivery, they must be quarantined and followed by laboratory examination. If a disease is detected, you should contact the quarantine laboratory of the phytosanitary inspection to confirm the diagnosis and take quarantine measures to limit the spread of the disease in the territory of the Republic of Kazakhstan. Infected samples are seized.

Compliance with crop rotation, weed control, soybean return to their original location after 3-4 years, destruction of plant debris, deep autumn plowing reduces the level of soil infection and reduces the likelihood of plant diseases. Good predecessors are winter and spring wheat, barley. During the growing season, one should not allow thickening of crops, the use of large doses of nitrogen and other fertilizers, and also sow soybeans after sunflower and cotton.

Presowing seed treatment should be carried out with one of the medications: TMTD, -4kg / t-vitovaksom 200FLO 2kg / t-agrozolom 3kg / t-benlatom 3kg / t, derazolom2l / t, fundazol -3kg / t, kolfugo super -2.0 kg / r, Scarlet 0.4 l / t, Maxim -2.0 L / t which reduce lesion quarantine aforementioned diseases and are conducive to making further ot2,5 to 4.4 c / ha. grain. Germination of grain etching the above drugs increases from 1.5 to 7%. For the timely detection and prevention of the further spread of dangerous quarantine diseases, it is necessary to regularly conduct a quarantine inspection when importing seeds from abroad and to examine soybean crops 2-3 times prior to harvesting. If a disease is detected, it is necessary to report to the State Inspectorate for Plant Quarantine of the State Agro-Industry of the Republic.

Blight disease for Kazakhstan is an object of external quarantine. It affects plants throughout the growing season. The disease manifests itself in the form of root and stem rot, affects stairs, adult plants, beans and seeds. In the seedling phase, signs of the disease appear on the stem root and lateral roots in the form of brown spots, under which the tissue rots. The spots grow rapidly; cover healthy tissues, as a result of which the roots die off, water exchange is disturbed. Dark brown conducting vessels of the root system are found on the cut of affected plants. Plants with affected roots stop in their growth and development first wither, the tip tends to the surface of the soil, and then the whole plant dies.

The leaves of the young affected plants have the appearance of scalded boiling water; at first they are yellow, watery-transparent. Later, brown spots appear on the leaves, which are limited on the sides by veins of the leaf blade, the affected tissue fades, turns brown and dries. Leaf blades become brittle, easily break. Brown stains form on the stems, which quickly grow, cover significant parts of its surface, the affected tissue rots and the plant gradually dies. First, the lower leaves turn yellow, and the upper ones have a chlorous appearance. Withering spreads from the bottom up. The disease is highly specialized below fungus *Phytophthorasojae Kaufm. etGerd*. (Syn.Ph. megasperma Drech.var. SojaeHildeb), which is affects only soybean. The fungus forms in the intercellular spaces of plant tissues unicellular mycelium, in which the hyphae branching at right angles and have a tumor structure. Often near pathogen Ph. megaspermavar. Sojae can be distinguished *Rhizoctoniasolani Kunn* and some species of the genus *Pythium*. During the soybean growing season, the pathogen forms asexual sporulation in the form of simple or branched

weak branches, on the tops of which spherical or lemon-shaped zoosporangia are formed. Zoosporangia sprout with the formation of 12-40 bicotyped bean-shaped zoospores.

The development of the fungus occurs in a temperature regime of 5-35 ° C (optimum 23-25 ° C) and soil moisture 60-80% of the total moisture capacity. In the presence of favorable weather conditions, a white coating of asexual sporulation appears on the surface of the affected plant tissues. Plaque is formed 15-30 hours after watering soybeans or heavy rainfall. Zoospores of the fungus travel long distances in the soil, causing root infection. In the phase of the formation of beans - the ripening of the seeds of the zoosporangia of the fungus is carried by raindrops, insects, wind on the beans; the pathogen penetrates the cusps, affects immature seeds.

During sexual development, the fungus forms thick-walled brown spherical oospores, which often appear in the intercellular spaces of the parenchyma, less often in the vascular tissue of plants. Late blight is especially dangerous for varieties susceptible to the disease, most of the plants, which die during the disease, and the yield can be reduced to 50%. The crop shortage depends on the type of soil, rainfall, agricultural technology and variety. Soybean is more affected in wet years, and in arid weather conditions it limits the spread of the disease. The source of infection is the affected seeds, in which the pathogen mycelium is stored and the affected crop residues, on which the fungus is stored in the form of oospores. In the soil, the infection is viable for 5-7 years. Infection of the plant occurs in the soil through the roots.

The harm of the disease is manifested in the loss of seedlings and adult plants, a decrease in seed germination and grain yield by 25-40%.

If late blight is detected in soybean crops, all recommendations and regulations regarding quarantine facilities should be carefully followed. In countries where the disease is common, effective measures against late blight are the observance of crop rotation, removal or smelling of crop residues. Of great importance are seed dressing and spraying of plants with fungicides during the growing season.

In general, our studies on the study of especially dangerous quarantine diseases of soybeans, their particularities in the biology of pathogens, and also on the development of measures to combat them allow us to conclude the following measures. Compliance with quarantine rules. Prevent the importation of diseases with seed material that are absent in Kazakhstan. Especially dangerous soy diseases in Kazakhstan, in comparison with other countries of the near and far abroad, shows the absence in our conditions of a number of dangerous quarantine diseases of this culture

The quarantine diseases for soy in Kazakhstan are stalk cancer, burn of beans and stems, seed rot, purple *cercosporosis* and late blight. The above diseases are widespread in Russia; they are able to spread with soybean seeds. This circumstance requires strict observance of quarantine rules. Compliance with the technology of soybean cultivation and the quality of agricultural practices in the optimal time. They include the development of the recommended scientifically based crop rotation, the placement of soybeans according to the best predecessors: winter wheat, barley and oats.

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