ANNEX 2

### FEDERAL VETERINARY AND PHYTOSANITARY MONITORING SERVICE

### **Federal Government Agency**

# ALL-RUSSIAN CENTER OF PLANTS' QUARANTINE (FGA VNIIKR)

### APPROVED

Director of the Federal Government Agency All-Russian Centre for Plants' Quarantine (FGA "ARCPQ")

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# PEST RISK ANALYSIS OF FOUR-SPOTTED BEAN WEEVIL CALLOSOBRUCHUS MACULATUS FOR THE TERRITORY OF THE RUSSIAN FEDERATION

**Moscow** – 2006

Pest risk analysis of four-spotted bean weevil *Callosobruchus maculatus* **F.** for the territory of the Russian Federation is prepared by chief agronomist of the scientific and methodological support department of FGA ARCPQ, Candidate of Science (Biology) **E.A. Sokolov.** 

Materials have been reviewed and approved by the scientific and methodological board of FGA AECPQ (minutes No. of "\_\_\_\_\_, 2006).

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#### Introduction

Polyphagous weevils of *Callosobruchus* genus are the most dangerous pests of pulse crops: soybeans, mung bean, cowpea, bean, horse bean, green and pigeon pea, chickpea, rank, lentils, honey locust, dolichos and other crops. They not only reduce the crop in the field, but with the grain of the new harvest enter in storage and continue to develop as pests of stocks without falling into diapause. So they greatly reduce food value and quality of the grain of many pulse crops. Genus Callosobruchus amounts 15 species (Lukyanovich, 1937; Saplin, 1985: Kingsolver, 2001, Wemer, 2000). 4 species of this genus are practically delivered with grain of pulse cropsto other countries, including the Russian Federation, namely: Callosobruchus phaseoli Gyll. - Indian bean weevil; C. Analis L. - Asian polyphagous weevil; C. hinensis L. - Chinese weevil and C. maculatus F. - fourspotted bean weevil (Voronenko, 1980; Nikritin, 1995; Shutova, 1964). All these species are similar by biology, injuriousness and natural habitats. Morphologically they are clearly different by imago, but are indistinguishable by the larvae. For this reason live *Callosobruchus* larvae identified in the grain of pulse crops should be considered a sufficient basis for imposition of quarantine sanctions. Pest risk analysis of import of polyphagous weevils into the territory of the Russian Federation is carried out for the most commonly imported and studied species of C. maculatus F. –four-spotted bean weevil.

# Part 1. General information on the pest

1. Scientific rationale of pest risk analysis of expansion of *Callosobruchus maculatus* F. –four-spotted bean weevil for the territory of the Russian Federation

Synonyms: Bruchus guadrimaculatus F. Bruchus bistriatus F. Callosobruchus guadrimaculatus F. Systematic position: class - Insekta, squad - Coleoptera, family - Bruchidae.

# 2. Geographical expansion

Europe: Belgium, Bulgaria, Great Britain, Hungary, Greece, Spain, Italy, France, Yugoslavia.

<u>Asia:</u> Burma, Vietnam, India, Iraq, Iran, China, Korea, Syria, Turkey, Japan, Kazakhstan, Uzbekistan, and Turkmenistan.

<u>Africa:</u> Algeria, Angola, Ghana, Zaire, Nigeria, Egypt, Senegal, Sudan, Tanzania, Ethiopia, South Africa.

<u>America:</u> Cuba, Honduras, Mexico, Trinidad and Tobago, Jamaica, Bolivia, Brazil, Venezuela, the United States (including the staff of the Hawaiian Islands). <u>Australia:</u> Commonwealth of Australia, Fiji Islands.

# 3. Biology

Beetles of four-spotted bean weevil escaping from grainsare sexually mature and ready to mate and lay eggs. They are active and able to fly independently from storage to populate the nearby plantings of pulse crops. Range of expansion of the imago active form is up to 3- 5 km (Mordkovich 1987; Slidzevskaya, 1991). The female of four-spotted bean weevil lays eggs in the field on bean valves or on wing bean seeds, pasting them with quick-setting secretions of sexual glands. Up to 15 eggs may be laid on one seed. Fecundity of one female is about 100 eggs. Laying period lasts from 5 days in the summer to 38 in the winter, in places of storage. Egg phase lasts from 5 to 12 days. After hatching, the larvae bore into the seed and feeds on its contents, making a move. Larva is legless, white, hairless, and sedentary, sheds three times and grows up to 4 mm,gnaws a cavity in the grain in which it is pupated, pre-notched inside in thesecundines a circular outlet for the beetle. The duration of the larval stage at 30°C lasts 11 days, at 22°C increases up to 25 days, and at 17°C delays up to two months.

# 4. Ways of transfer and expansion

The four-spotted bean weevil is actively resettled within the locality by flight. For long distances been weevil is delivered by person with the infected grain of pulse crops.

# 5. Methods for detection four-spotted bean weevil 5.1. Inspection of warehouses and premises of enterprises

Visual inspection with sampling and analysis of samples of stored products is held 1 - 2 times during the warm season (Voronenko, 1980; Nikritin, 1995). First of all storages located at points of entry: at sea and river ports, airports and border stations are inspected. Then storage facilities and processing plant of imported pulse crops agricultural products in the country (bakery, cereal packaging line shops and feed mills) are inspected. Thorough inspection should be carried out in warehouses of raw materials and finished products of enterprises processing imported pulse cropsproducts as well as seed warehouses, laboratory space of research stations, botanical gardens and research institutions where seeds of imported pulse crops were stored.

Examination includes inspection of walls, floor, ceiling, pillars, roof beams, various storage equipment, tools and machinery. At the same time spills and brooms are carefully browsed, collecting warehouse trash on sieves. All fractions areviewed on paper. Dead insects are placed in separate tubes. Live beetles are prestained and then placed on cotton mattresses. In addition to premises all stored batches of pulse crops should be inspected. Live larvae with infected bean products should be taken for laboratory examination by biological method (rearing to imago).

All material is provided with a label and sent to the lab for identification.

In addition to the survey of warehouse facilities and products in the warehouse it is necessary to investigate the territory nearby to the warehouse and outside the warehouse, paying particular attention to spills and brooms of grain and plant debris near the warehouse.

### 5.2. Survey of pulse crops' plantings during the growing season

The best time to surveypulse crops in the field is the phase of full maturity (cracking of beans). There used a method of shuttle passage by2 diagonals, with stops in 50 steps for inspection of plants and selection of spot samples of 15 - 20 beans. 10 samples are taken from the area of up to 1 ha, 35 samples are taken from the area of 30 hectares, 40 samples – from the area of 40ha. All test plantings of imported seed if research institutions and government land plots shall be screened.

It is important to know that beetles live on plantings for about 10 days, actively fly and lay eggs in hot afternoons on the top, the most mature beans illuminated by the sun. Samples selected in the field shall be provided with labels, analyzed in the laboratory under a binocular microscope for the presence of egg-laying offourspotted bean weevil, which is the basis for taking quarantine measures.

# 6. Morphology

**Beetles** of four-spotted bean weevil have short oval shape. The body is reddish-brown in color, length -3 mm, width -1.7 mm. Antennae have 11 segments, in male and female are serrated. The upper body is covered with dark, white and grayish-yellow hairs forming spots, which can vary greatly. In typical instances black spots in the middle of the elytra are located along the outer edge. They cover shoulders and the top of the elytra. Light areas of elytra are covered with light grayish-yellow hair, which form a picture in the letter H.

On each side of 2-5 sterna of the abdomen there are no white spots formed by hairs, as the Chinese been weevil.

*Egg* is oval, little sharpened to one end, flat in the bottom and convex on the top, its length is 0.7 mm, width is 0.4.

*The larva* is white, curved, legless, without hairs, body length is up to 4 mm. *Pupa* is naked, oval-shaped tapering to the rear end.

# 7. Detection and identification

To identify the direct and indirect contamination of seeds ofpulse cropswith polyphagous bean weevils of *Callosobruchus* genus there should be carried out a compulsory quarantine inspection of all pulse crops production in primary points of entry – at seaports, airports, railway border stations, vehicle and passenger crossings. During the inspection of vehicles – freight cars, ships in port, aircraft cabins attention should be paid to the possible presence of live insects in premises for the team, holds, food pantries (galleys). In case of detection of live Callosobruchus beetles there should be taken measures to destroy imago by treatment of facilities with aerosols. Infected pulse crops cargo should be decontaminated in holds of the ship at anchor to prevent dispersal of been weevils in the dock.

During the inspection a general sample is taken from consignments of pulse crops that can be seen in the presence of insects, damaged seeds, egg-laying, "caps" and flight holes on seeds. An average sample weighted 1 kg is taken of the total sample and together with selected insects and damaged grains, packed in test tubes and labeled and sent to the laboratory for detailed analysis. In the laboratory the sample is analyzed, if necessary, by means of flotation and radiography. Parcels and packages coming with seeds of pulse crops to botanical gardens, research institutions and private individuals are subject to the same inspection.

Please note that identification of detected bean weevils of Callosobruchus genus is only possible by imago (Saplin 1985; Sokolov, 1999).

Identification by pre-imago stages – eggs, larvae, pupae – is only possible to the sort. To determine to the type the sample with live pest larvae is placed in an oven where it is rearing to imago at the temperature  $+30^{\circ}$ C.

# 8. Harmfulness

### 8.1. Assessing the economic significance

Polyphagous pest of pulse crops hurts china bean, vetch, peas, fava beans, corn, mung bean, soy, beans, lentils, pea everlasting, Congo peas, dolichos and wisteria. It harms in the field and in warehouses. Along with seeds it is imported into the storage facilities, where further harm to stored reserves of pulse crops as a typical warehouse pest. In case of optimal conditions for the development bean weevil breeds a lot and can completely destroy reserves of pulse crops during winter storage.

### 8.2. Damage to the environment

Forced chemical processing of enterprises and grain storage facilities against pests of reserves having quarantine significance, particularly bean weevils of Callosobruchus genus, with methyl bromide, phosphine, organophosphate, pyrethroid and other pesticides increases the pesticide load on the environment.

### 8.3. Social harm

Due to the potential expansion of four-spotted bean weevil in the territory of the Russian Federation social damage will be expressed in a possible loss of foreign markets with countries where this pest is absent as quarantine object. This will prevent free trade with the European Union and would create additional economic costs for disinfection of exported bean products.

### 9. Quarantine measures

Import of pulse crops products to the territory of the Russian Federation from countries of expansion of four-spotted bean weevil is allowed under the following conditions:

- In case of availability of import quarantine permit issued by the State Phytosanitary Service of the Russian Federation, which defines terms of entry and the use of imported products.
- In case of availability of a quarantine certificate from Government phytosanitary authorities of the exporting country certifying the absence of live animals of four-spotted bean weevil and other species of Callosobruchus genus in imported products.
- In case of mandatory quarantine inspection at places of entry of agricultural products, container, vehicles from countries of expansion of polyphagous been weevils, as well as ata detailed secondary compulsory quarantine inspection of such products at points of receipt and sale.

In case of detection of four-spotted bean weevil in the grain, container or vehicle the above should be immediately decontaminated by fumigation with methyl bromide or phosphine drugs on modes that provides 100% mortality of been weevil in all phases of development.

In case of detection of four-spotted bean weevil on plantings of pulse crops, storage facilities or industrial buildings of enterprises are subject to quarantine in accordance with the "Law on Plant Quarantine", up to complete elimination of the hearth.

# **10.** Risk assessment of import and acclimatization of *Callosobruchus maculatus* F. on the territory of the Russian Federation

To quantify estimation there should be used 9-point scale from the lowest probability of the presence of risk factors or damage (score - 1) to a maximum (score - 9) by the method of EuropeanPlant Protection Organization(EPPO) (A.D. Orlinskiy 2002; The methodology of pest risk analysis ..., FGA VNIIKR, 2005).

# Part 2. Pest risk analysis of Callosobruchus maculatus for the territory of the Russian Federation by scale system (according to the EPPO procedure)

Pest Risk Analysis (hereinafter PRA) is carried out in accordance with EPPO standards for determining the quarantine status of the four-spotted bean weevil - *Callosobruchus maculatus* for the territory of the Russian Federation (Smith, Orlinskiy, 1998, 1999, 2001; Methodology of pest risk analysis ... FGA VNIIKR, 2005).

Item numbe r of the scheme	Scheme item	Brief answer		Switch to which item
1	Taxonomic unit and possibility of its identification	Selected option - Yes	Yes No	3 2
2	Possibility to identify a type in another way	No	No Yes	3 22
3	Determination of PRA area	Territory of the Russian Federation		4
4	Prior PRA for this pest	No	No	7
5	The possibility of partial or total application of prior PRA for a specific pest		No	7
6	Start evaluating, comparing with the previous PRA			7

# The preparatory phase of PRA

# <u>Pest risk assessment.</u> Part A: Pest categorization (qualitative criteria that distinguish a quarantine pest)

Item numbe r of the scheme	Scheme item Brief answer			Switch to which item
	Geogr	raphical criteria		
7	The presence of the pest in the area of the PRA	No	No	9
8	The spread of the pest in the area of the PRA		·	22

	<u>Potential possil</u>	bilities for acclimatization		
9	Food stocks in PRA area (in nature and in storage)		Yes	10
10	Intermediate or additional host plants			
11	The presence of intermediate or additional host plants in PRA area			
12	The presence of vectors at current pest			
13	The presence of vectors (similar species that may become vectors) in PRA area + the ability to easily penetrate it and acclimate			
14	The presence of eco-climatic zones comparable to eco- climatic zones of the PRA area in the present area of current pest		Yes	18
15	The possibility of survival and reproduction of the pest in a wider area, including the PRA area		Yes	18
16	The possibility of survival and reproduction of the pest in heated premises in the PRA area		Yes	17
17	Availability of food supplies in a grain storage facilities in the PRA area		Yes	18
	The poten	<u>utial economic value</u>		
18	The damage caused by the current pest to plants in its present area, similar to conditions of the territory for which PRA is carried cout		Yes	21
19	The damage caused by the current pest to plants in the PRA area, taking into account all factors affecting the display of damage		Yes	21
20	Damage of another kind (social damage, environmental damage, loss of export market) caused by the pest		Yes	21
21	The pest can pose a risk to the PRA area		Yes	Part B

22	Current pest cannot be classified	End
	as a quarantine pest for the PRA	
	area and the estimation	
	procedure can be terminated	

# <u>Pest risk assessment.</u> Part B: Quantitative assessment (the probability of unintentional introduction, the probability of penetration)

Item number of the scheme	Item coeffic ient	Scheme item	Brief answer		Switch to which item
1.1	4	Possible pathways for the current pest	Different types of food and seed pulse crops	Min Max Yes	1 9 4
1.2		For each pathway please answer questions 1.3 - 1.13.			Go to 1.3
1.3a		The possibility of pest expansion through current pathway	Yes	Yes No	1.3b 1.2
1.3b	8	The possibility of pest connection with the pathway at its beginning		Min Max	1 9 7
1.4	5	The value of pest concentration in the beginning of the pathway		Min Max	1 9 6
1.5a		The possibility of pest survival under existing economic and trade practices	Yes	Yes No	1.5b 1.2
1.5b	7	The possibility of pest survival under the existing economic and trade practices	Yes		6
1.6	8	The probability of pest survival and its preservation unnoticed in existing phytosanitary procedures	The probability of survival is high. The probability of penetration with seeds – 5	Yes	5
1.7a		The possibility of survival while pest transit	In a food substrate, high	Yes No	1.7b 1.2
1.7b	9	The probability of pest survival while	High	Yes	9
1.8	3	The probability of pest reproduction while transit	Depending on cargo temperature	Yes	4
1.9	4	The intensity of cargo movement on current	Moderate, seeds for scientific purposes and	Yes	4

		pathway	food		
1.10	6	The volume and breadth of goods distribution in PRA area	Pulse crops for processing and marketing	Yes	7
1.11	9	The time during which arrival of goods will be stretched	During the year	Yes	9
1.12a		The possibility of pest getting from the pathway to a suitable plant		Yes No	1.12b 1.2
1.12b	9	The possibility of pest getting from the pathway to suitable products	High, as it is delivered with contaminated grain products		9
1.13	9	The probability of pest introduction with the intended method of product use	High with contaminated imported seed products		9

# <u>Pest risk assessment.</u> Part B: Quantitative assessment (probability of unintentional introduction, probability of acclimatization)

Item numbe r of the scheme	Item coefficie nt	Scheme item	Brief answe	ſ	Switch to which item
1.14	6	The number of species of plant food products present in PRA area	Chapter 1. Biology of four-spotted bean weevil. More than 10 species of pulse crops products	Yes	7
1.15	5	The frequency of occurrence of plant products in PRA area	Ubiquitously		6
1.16		The frequency of occurrence in PRA area of intermediate host plant, if current pest needs it for development cycle			
1.17		The probability of relation of pest with a suitable vector (if required in thevector)			
1.18		The presence of current pest in crops in greenhouse elsewhere			

1.19		The probability of role of wild plants in expansion or maintenance of pest populations		
1.20	7	The presence of climatic analogs in PRA area and in area of origin of current pest	Krasnodar kray, Pre-Caucasian region, Primorye	8
1.21	8	The similarity of other abiotic factors in PRA area and in the area of origin of current pest	There is identity of abiotic factors of areas of origin of four-spotted bean weevil and PRA area	8
1.22	6	The probability of lack of competition on the part of species existing in PRA area	Moderate competition is possible on the part of local species of Bruchidae	3
1.23	4	Probability of obstacles for acclimatization of current pest by natural enemies that exists in PRA area	There are no natural enemies	0
1.24	5	The probability of conditions for pest acclimatization	Heated premises, plantings of pulse in the field	76
1.25	4	The probability of lack of obstacles of control measures used against other organisms in PRA area for pest acclimatization	Control measures at grain processing enterprises and warehouses for disinfection. In the field weevil control measures are not carried out	7 9
1.26	7	Probability to promote reproductive capacity and duration of development cycle of current pest and its acclimatization	The storage period of crops is extended until the year	8
1.27	6	The probability of possibility of acclimatization of small populations of current pest	It is likely	6
1.28	3	The possibility of eradicating of pest population in PRA area	Probablyprovidedforpromptlytakenmeasuresforlocalizationandelimination(Ch."Biology")	7
1.29	5	Genetic adaptation of current pest	Not studied	5

1.30	8	The frequency of Delivery - often - 6;	4
		introduction (importation) localization - usually	
		of the pest to new areas successful - 5;	
		outside of the area of origin liquidation - satisfactory	
		- 3	

# <u>Pest risk assessment.</u> Part B: Quantitative assessment (assessment of economic damage)

Item numbe r of the scheme	Item coefficie nt	Scheme item	Brief answer		Switch to which item
2.1	9	Economic losses caused by the pest within its current area	Significant – for elimination and preventive measures		6
2.2	3	The value of the environmental damage caused by current pest in its present area	Minor – because of low density of lesions in the field; Essential for disinfection of contaminated batches of grain of pulse crops	26	4
2.3	3	The value of the social harm caused by the pest within its current area	Significant - in the area of expansion		4
2.4	7	The value of PRA area, which may show damage caused by the pest	The entire territory of the Russian Federation in the heated premises		6
2.5	8	The rate of natural pathways of current pest in PRA area	Low - within the enterprise		3
2.6	8	The speed of expansion of current pest by human on PRA area	High - with contaminated products		6
2.7	8	The possibility of limitation of pathway of current pest in PRA area	High - subject to compliance with quarantine restrictions		7
2.8	9	The probability and volume of direct impact of current pest on the crop and/or its quality in PRA area	The high economic impact		6

2.9	8	Possibility of impact of current pest on profits of producers in PRA area due to changes in prices, yields, etc.	Impact on trade and prices - high	7
2.10	6	Possibility of impact of current pest on consumer demand in PRA area	High	9
2.11	7	Probability to affect current pest in PRA area on export markets	Moderate	3
2.12	3	The amount of costs associated with the possibility of the introduction (importation) in PRA area of current pest	High	5
2.13	4	The value of damage to the environment in PRA area of current pest	Moderate	2
2.14	4	The value of social damage in PRA area of current pest	Moderate	5
2.15	2	The probability of lack of suppression of current pest by natural enemies already existing in PRA area, in the case of its introduction (importation)	Excluded	9
2.16	3	The possibility of carrying out various measures to combat current pest	Possible	8
2.17	1	Possible violation of the existing system of biological and integrated plant protection from other harmful organisms during action against current pest	Low probability	3

# Pest risk analysis of Callosobruchus maculatus F. for the territory of the Russian Federation

2.18	1	Possibleundesirableeffectsandadverseeffects(e.g., on humanhealthortheenvironment)duringactionsagainstcurrentpest	Low probability	3
2.19	3	The possibility of developing resistance in current pest to the existing plant protection products	High probability	7

### Final quantification of pest risk of four-spot bean weevil Callosobruchus maculatus for the territory of the Russian Federation

Probability of entry for the main pathway of expansion (P)				The probability acclimatization (PA)				Potential economic harmfulness (PEH)			
Item number of the scheme	Item coefficie nt Wi	Rating on a scale ai	Wi * ai	Item numbe r of the scheme	Item coefficie nt Wi	Rating on a scale ai	Wi * ai	Item number of the scheme	Item coefficie nt Wi	Rating on a scale ai	Wi * ai
1.1	4	4	36	1.14	6	7	42	2.1	9	6	54
1.3b	8	7	56	1.15	5	6	30	2.2	3	4	06
1.4	5	6	30	1.16	-	-	-	2.3	3	4	12
1.5b	7	6	49	1.17	-	-	-	2.4	7	6	42
1.6	8	5	48	1.18	-	-	-	2.5	8	3	24
1.7b	9	9	81	1.19		-	-	2.6	8	6	48
1.8	3	4	9	1.20	7	8	56	2.7	8	7	16
1.9	4	4	20	1.21	8	8	64	2.8	9	6	72
1.10	6	7	48	1.22	6	3	36	2.9	8	7	72
1.11	9	9	81	1.23	4	0	0	2.10	6	9	54
1.12b	9	9	81	1.24	5	7	30	2.11	7	9	63
1.13	9	9	81	1.25	4	8	24	2.12	3	6	27
				1.26	7	8	56	2.13	4	2	08
				1.27	6	6	36	2.14	4	5	20
				1.28	3	7	06	2.15	2	9	18
				1.29	5	5	25	2.16	3	8	24
				1.30	8	4	32	2.17	1	3	03
								2.18	1	8	08
								2.19	3	7	21
Total	81	79	578	Total	74	77	447	Total	97	115	595

PD = P \* PA \* PAH/100 = 7.14 \* 6.0 6.1 \* 100 = 2.61 PD- potential damage (∑ai \* Wi) / ∑wi

PH= =

578:81 = 7.14 PH – potential harm

 $\sum_{i=1}^{i} ai * Wi) / \sum_{i=1}^{i} wi$ 

- $\mathbf{PA} = =$ 447:74=6.0
- PEH (∑ai \* Wi) / ∑wi 595: 97 = 6.1
- PA probability of acclimatization
- PEH potential economic harm

Part 3. Assessment of Reduction of Pest Risk in delivery and further expansion of *Callosobruchus maculatus* Identification of pathways and their sturdiness to reduce the pest risk of delivery

### Path 1. Seeds for sowing

Seeds of various pulse crops damaged by polyphagous bean weevils, imported for planting, testing and selection plants and botanical gardens.

### Path 2. Grain of pulse crops for different purposes

Grain of pulse crops, imported for food and feed purposes in case of spillage in transit, in places of storage and processing or sales through dealers' network.

### Other ways of expansion

Delivery of grains of pulse crops in the baggage of passengers and immigrants.

The risk of expansion with the infected grain in transit is increased in case of transportation in warmer months, when bean weevil is in phase of active imago and shatters actively.

# Identification of possible control measures in different types of bean weevils' expansion

# Path 1: Seeds for sowing

### Measures relating to the cargo

- Seeds should pass the border inspection and laboratory tests for the presence of quarantine pests.
- Seeds from countries of expansion of polyphagous beans weevilsshould be decontaminated before shipment to the Russian Federation.

### Measures related to the culture and the place of production

• Seeds should be produced in the area free from polyphagous bean weevils under results of field survey.

# Path 2: Grain of pulse crops for different purposes

### Measures relating to the cargo

- Phytosanitary inspection at port of entry for infection of grain of pulse crops with polyphagous bean weevils.
- Secondary inspection of grain of pulse crops in places of sale.

# Measures related to the culture and the place of production

• Grain ofpulse crops should be produced in the area free from *Callosobruchus* bean weevils according to results of the field survey.

# Other pathways four-spotted bean weevil

- In the luggage of air passengers from countries of south-east Asia, delivering pulse crops for personal consumption.
- In the luggage of rail passengers from Central Asia, delivering grain of beans, mung and lobio for market sale.
- In storage premises of merchant vessels that have stocks of grain of pulse crops for team food.

Types of delivered products	Terms of cargo delivery into the Russian Federation
Grain of pulse crops, food, seeds and fodder produced in countries that are free from <i>Callosobruchus</i> bean weevils	Possible, subject to compliance with phytosanitary requirements of the Russian Federation (IFR, FS, or PC)
Grain of pulse crops produced in countries of expansion of bean weevil	Possible, subject to compliance with phytosanitary requirements (FS. or PC)
	Before shipment to the Russian Federation grain of pulse cropsshould be disinfected in the importing country by modes that provides 100% biological efficiency Inspection and laboratory testing is performed when grain of pulse crops arrives to the territory of the Russian Federation.

# Terms of cargo delivery into the Russian Federation

# Conclusion

As a result of the pest risk analysis of delivery of four-spotted bean weevil into territory of the Russian Federation it was found that the weevil of *Callosobruchus*genus may be delivered with pulse crops products, may be found in heated premises of grain processing enterprises, research institutions and selection stations, grocery stores, retail stores, residential homes throughout Russia and cause great economic harm to food and seed bean products.

The final quantitative pest risk assessment of delivery of four-spotted bean weevils for the territory of the Russian Federation showed that the potential damage amounts to 2.61 standard units with an average indicator 1.25 standard units (Orlinskiy, 2002).

Results of the performed study show the need to include polyphagous bean weevils of *Callosobruchus* genus, including four-spotted bean weevil - C. *maculatus* F. in the "List of quarantine pests that are not registered in the territory of the Russian Federation".

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