

## DISTRIBUTION OF INVASIVE AND QUARANTINE WEEDS ON AGRICULTURAL REGIONS OF KAZAKHSTAN

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### Annotation

This paper reviews the distribution of several species of invasive and quarantine weeds (*Ambrosia artemisiifolia*, *Cuscuta sp.*, *Acroptilon repens*) on the territory of Karasay region, in Almaty. Weed is a plant that grows without human control; however effectively grow in agricultural region while reducing crop yield and quality of plant. Invasive quarantine weeds in Kazakhstan are divided into five species according to their distribution in the certain area.

As a result of quarantine monitoring analysis in Karasay region the agricultural crops are contaminated with three species of weeds and indicated a different dynamic distribution in the given area.

**Keywords:** weeds, herbology, quarantine, perennial, *Ambrosia artemisiifolia*, *Cuscuta sp.*, *Acroptilon repens*.

### Introduction

A weed is a [plant](#) considered undesirable in a particular situation, "a plant in the wrong place". Examples commonly are plants unwanted in human-controlled settings, such as [farm fields](#), [gardens](#), [lawns](#), and [parks](#) [1]. Seed dispersal of weeds are also particularly important for weed population dynamics in agricultural environments because the frequent agronomic disturbance of the agroecosystem induces continuous recolonization of the ecological niche and also fulfills the ecological role of favoring the colonization of new areas [2].

In recent years we often meet the terminology «**quarantine**» in **agriculture**. **By this term «quarantine» means an infectious diseases and protection from**

**harmful objectives and complex of methods in order to combat against the diseases and insects [3].**

After gaining our independency significantly accelerated the spread of plant insects, diseases and weeds from abroad. And nowadays protection events of plants against harmful insects, diseases are very acute problem in our country. Imports of plants from overseas can increase the risk of introduction and distribution of quarantine weeds into Kazakhstan is enhancing and it leads a threat to food security and economy.

In 2014 only in Almaty region was imported and transported from 67 foreign countries products that involved in quarantine 46 000 ton products, 5 000 ton technical

products, 680 ton seed materials, 3740 000 seedlings, and 22.6 million pot plants. All of the materials are tested for presence of quarantine objects which may pretend a significant threat to the plant or vegetable product. As a result of investigation two parties of quarantine insects are observed. One of them is a 5421 flower from Netherland and second 880 flowers from Kenya. In addition were founded harmful insects that are not observed on the territory of Kazakhstan up to date and facilitated their spread by burning in muffle oven. Therefore all of these results indicate that investigating the varieties of the object of quarantine, weeds that are not present in the country's territory, developing forecast of distribution in order to prevent their entry to Kazakhstan are very important. Introduction of quarantine objectives cause high risk for distribution of plant diseases and weeds [3].

According to the order №322 of Ministry of Agriculture of Republic of Kazakhstan in 2006 from June in the territory of Kazakhstan was formed phytosanitarian center to control plant quarantine system. Phytosanitarian centers are located in the international airport and railway stations represented the service of state inspectors in the frame of plant quarantine. They provide protection of plants, product of plant processing, raw materials imported from other

### **Materials and methods**

Among the weeds the most dangerous type of weeds is invasive weeds and they have also parasitic

country, when it is needed they can take sample, transport facilities, luggage, in order to make laboratory test and passport of validity of transit quarantine products. At the end of research all the quarantine objects will conduct re-check procedures for the quarantine verifications.

Afterwards plant growth conditions, cultivations, gathering, treatment, and import the final product, internal market objectives, farms, the territory of house and garden, villages, forest, water and other farms with different purpose will provide the stable control test (2.4).

Currently in the territory of Kazakhstan distribution of 15 quarantine objectives are found. It is USA screech-owl, east fruit moth, melon fly, west (California) flower trips, gold potato nematodes, potato moth, unpair silkworm (*Bombyx mori* Z), Comstock worms, Ambrosia artemisiifolia, Acroptilon repens and Cuscuta.

Among them in Almaty, on Karasay region some quarantine objects are observed such as east fruit moth, melon fly, west (California) flower trips, Ambrosia artemisiifolia, Acroptilon repens and Cuscuta.

In 2012-2014 years 87572 hectares of agricultural land and field carried out monitoring control for invasive weeds in order to restrict spread of insects and plant diseases.

types which lead to loss of plant yield and quality. Therefore it is very important to find out integral methods

against weeds and organizational events to improve agricultural crop quality.

At the present according to Ministry of Agriculture of Kazakhstan affirmed the following list of internal

***Ambrosia artemisiifolia* L.**

**Family – Asteraceae**

**Distribution.** The plant is native to: [North America](#) across [Canada](#), the eastern and central United States, the [Great Plains](#), and in [Alaska](#); the [Caribbean](#) on [Cuba](#), [Hispaniola](#), and [Jamaica](#); and [South](#)

**Description**

The species name, artemisiifolia, is given because the leaves were thought to bear a resemblance to the leaves of [Artemisia](#), the true wormwoods.

*Ambrosia artemisiifolia* is an [annual plant](#) that emerges in late spring. It propagates mainly by [rhizomes](#), but also by seed. It is much-branched, and grows up to 7 decimetres (2.3 ft) in height. The pinnately divided soft and hairy

**Disadvantageous**

Common ragweed is a very competitive weed and can produce yield losses in soybeans as high as 30%. Control with night tillage reduces emergence by around 45%. Small grains in rotation will also

**Preventive control.**

As of 2005 several herbicides were effective against common ragweed, although resistant populations were known to exist. In 2007 several *Ambrosia artemisiifolia* populations were glyphosate resistant, exclusively in the USA.

As of 2014 the ragweed leaf beetle, *Ophraella communa*, has been found

invasive weeds: *Ambrosia artemisiifolia* L., *Ambrosia psilostachia* DC., *Acroptilon repens* (L.) DC., *Cuscuta* sp. (19 varieties), *Solanum rostratum* Dun.

[America](#) in the southern bioregion ([Argentina](#), Chile, [Paraguay](#), [Uruguay](#)), Kazakhstan. The distribution of common ragweed in Europe is expected to expand northwards in the future.

leaves are 3–12 centimetres (1.2–4.7 in) long. Its bloom period is July to October in North America. Its pollen is wind-dispersed, and can be a strong [allergen](#) to people with [hay fever](#). It produces 2–4 mm obconic green to brown fruit. It sets seed in late summer or autumn. Since the seeds persist into winter and are numerous and rich in oil, they are relished by songbirds and upland game birds.

suppress common ragweed if they are overseeded with clover. Otherwise, the ragweed will grow and mature and produce seeds in the small grain stubble. Its wind-blown pollen is additionally highly allergenic.

south of the Alps in southern Switzerland and northern Italy. Many of the attacked plants were completely defoliated. *Zygogramma suturalis* was introduced to Russia, and then China, for ragweed control, with very positive initial results [4].

***Acroptilon repens* D.C.**

**Family – Asteraceae**

**Distribution.**

A native to [Eurasia](#), Central Asia, Russian knapweed was introduced into [North America](#) in the late 19th century. Absent only from

**Description.**

*Rhaponticum repens*, [synonym](#) *Acroptilon repens*, with the common name Russian knapweed, is a bushy [rhizomatous](#) perennial, up to 8 dm tall. Stems and leaves are finely arachnoid-tomentose becoming glabrous and green with age. The rosette leaves are oblanceolate, pinnately lobed to entire, 2–3 cm wide by 3–8 cm long. The lower cauline leaves are smaller, pinnately lobed; the upper leaves become much

**Disadvantageous.**

Allelopathic and competitive interactions with crop plants can reduce yields. The weed is so bitter that contamination of grain by as little as 0.01% can reduce the quality of

**Reproductive biology**

. Each plant contains both male and female flowers (monoecious). Flowers are pollinated mostly by insects, fertilisation occurs only with outcrossing. The seed-heads of *R. repens* generally remain closed at maturity. Seeds are viable for 2-3 years, but longer with proper storage. Although it can reproduce by seed, vegetative reproduction predominates.

**Preventive control.**

Cutting, Mowing, Discing, and Pulling: These methods will remove above-ground biomass of the plant, and if used repeatedly over the course of the growing season, will stress plants. If cut while flowering, this will

southeastern U.S., it has become widespread in other regions, especially in the western United States.

reduced, sessile, serrate to entire. The heads are numerous terminating the branches. Flowers are pink to purplish, the marginal ones not enlarged. The outer and middle involucre bracts are broad, [striate](#), smooth with broadly rounded tips; the inner bracts are narrower with hairy tips. Pappus present with bristles 6–11 mm long. Fruit is a whitish, slightly ridged achene.

flour produced. The quality of forage is decreased if contaminated with *R. repens* and attempts to control it can be expensive.

Dense colonies form rapidly from adventitious buds on horizontally spreading roots. The root system consists of the taproot, one to many horizontal roots, and their vertical extensions. Tap roots reach a depth of 2 m in the first year, and 5-7 m in the second. Vegetative spread can be hastened by cultivation

also eliminate new seed production. However, Russian Knapweed extensive root system allows the plant to store energy and allow for regrowth after many repeated control events.

## Chemical Control

There are two herbicides that are reported as effective for controlling Russian Knapweed. To achieve maximum control, herbicides should be applied using a backpack sprayer or wick to prevent damage to non-target plants. Spraying during late fall, during the budding stage of the species will achieve best control.

*Cuscuta sp.*

**Family – *Cuscutaceae***

### **Distribution.**

*Cuscuta* (**dodder**) is a genus of about 100–170 species of yellow, orange, or red (rarely green) [parasitic plants](#). Formerly treated as the only genus in the family Cuscutaceae, it now is accepted as belonging in the [morning glory](#) family, [Convolvulaceae](#), on the basis of the work of the [Angiosperm Phylogeny](#)

### **Description.**

Dodder can be identified by its thin stems appearing leafless, with the leaves reduced to minute scales. In these respects it closely resembles the similarly parasitic, but unrelated genus *Cassytha*. From mid-summer to early autumn, the vines can produce small fruit that take the same color as the vine, and are approximately the size of a common pea. It has very low levels of chlorophyll; some species such as *Cuscuta reflexa* can photosynthesize slightly, while others such as *C. europaea* are entirely dependent on the host plants for nutrition.

Dodder flowers range in color from white to pink to yellow to cream. Some flower in the early summer, others later, depending on the species.

## Biological Control

The USDA has approved the use of a soil-dwelling nematod, *Subanguina picridis* (Russian Knapweed gall nematode) and a leaf-dwelling mite *Aceria acroptiloni* (Russian Knapweed mite) for biological control [5].

[Group](#). The genus is found throughout the temperate and tropical regions of the world, with the greatest species diversity in subtropical and tropical regions; the genus becomes rare in cool temperate climates, with only four species native to northern [Europe](#).

The seeds are minute and produced in large quantities. They have a hard coating, and typically can survive in the soil for 5–10 years, sometimes longer.

Dodder seeds sprout at or near the surface of the soil. Although dodder germination can occur without a host, it has to reach a green plant quickly and is adapted to grow towards the nearby plants by following chemosensory clues.<sup>[5]</sup> If a plant is not reached within 5 to 10 days of germination, the dodder seedling will die. Before a host plant is reached, the dodder, as other plants, relies on food reserves in the embryo; the cotyledons, though present, are vestigial.

The stem of a field dodder plant is threadlike and twining, it has no leaves or they may only appear as

### **Disadvantageous.**

After a dodder attaches itself to a plant, it wraps itself around it. If the host contains food beneficial to dodder, the dodder produces [haustoria](#) that insert themselves into the vascular system of the host. The original root of the dodder in the soil then dies. The dodder can grow and attach itself to multiple plants. In tropical areas it can grow more or less continuously, and may reach high into the canopy of shrubs and trees; in cold

### **Preventive control**

Preventive control is one of the most important and fundamental activities in any field dodder control strategy, which focuses primarily on prevention of plot infestation by: 1) cleaning all nearby plots: 2) cleaning field margins: 3) cleaning waste grounds: 4) destroying weed parasitized by field dodder: 5) maintaining irrigation canals dodder-free: 6) spreading rotted manure: 7) hand weeding dodder plants in small

### **Results.**

In 2016 in the Karasay region performed monitoring research about 78371 hectare and 891 hectare land was treated by Republic budget on quarantine weed species *Acroptilon repens*.

And for *Ambrosia artemisiifolia* in Karasay region 2579 hectare lands are investigated. 138 hectare lands were treated in farming region.

For *Cuscuta* plants monitoring research was performed for 6382 hectare land.

inconspicuous scale. After field dodder seeds have fully matured they fall off and accumulate on the ground.

temperate regions it is an [annual plant](#) and is restricted to relatively low vegetation that can be reached by new seedlings each spring.

Dodder is parasitic on a very wide variety of plants, including a number of agricultural and horticultural crop species, such as [alfalfa](#), [lespedeza](#), [flax](#), [clover](#), [potatoes](#), [chrysanthemum](#), [dahlia](#), [helenium](#), [trumpet vine](#), [ivy](#) and [petunias](#), and more [6].

areas, taking good care of the removed plants because dodder seedlings are able to survive only a few days without a host, while fully developed plants removed with their hosts are able to retain freshness up to a couple of weeks: 8) checking on potentially infestable crops at 15 days intervals to detect infestation in an early stage and take adequate control measures [7].

General by region in the farming zone lands contaminated by *Cuscuta* consisted -702,1 hectare, and treated about -222 hectare land.

Dynamics of distribution of weeds and the possibility of their control are given in Table 1. Monitoring test against distribution of weeds in Karasay region in 2014 consist 11.16 thousand hectare, among them in spring and summer 5.93 hectare land was investigated and in summer-autumn 5.23 thousand zones are investigated.

**1-table. Distribution of quarantine weeds in Karasay region**

Name of weeds	Investigated	Treated			
		Total	2012	2013	2014
<i>Acroptilon repens D.C.</i>	78371	1558	295	999,0	264
<i>Ambrosia artemisiifolia</i>	2579	305,6	35	113,2	157,4
<i>Cuscuta</i>	6382	702,1	100	280,3	321,8
Total:	87572	2565,7	430	1392,5	743,2

**Conclusion**

Types of protective preventive control of quarantine weeds:

In order to prevent distribution of quarantine weeds to other regions and farms we have to perform following events:

No need for cultivation of crops in weed contaminated area in order to prevent natural spread; Control and check seed material in the laboratory conditions, seed sterilization; Isolation of quarantine weeds and seeds and clean plant propagating material from weed contamination; Transformation of contaminated seeds to agricultural farms and regions are prohibited. To sterilize and seed treatment for forage with temperature and well cut. A seed which is invalid for cultivation will be treated with high temperature or will bury for soil depth with 1m. It is strongly prohibited to throw the rest of burned material for water, garbage and soil; Before to treat the soil with manure be sure that there is no distribution of weed seeds; In advance to

germination of seeds clean the water channel, and all additional way of distribution; Harvest agricultural crops on time or in advance in order to escape from the weed spread; Isolate contaminated yield from pure product; Systematically sterilize devices, equipments and storage place. Irrigation lands and agricultural farms should be sterile and to cultivate plants that control weeds spread. Traditionally treat and keep soil technology and additionally use herbicides in order to remove root systems of perennial weeds.

Clover which contaminated with *Cuscuta* might be a main source of invasive weed spread. Negative effect of *Cuscuta* to clover depends on parasitical activity of weeds.

Agricultural land that was not cultivated any crops allowed to treat with raundup, 36% b.p. – 4,0 l/ha, pivot, 10% – 1,0 l/ha, arsenal, 25 % – 3,0 l/ha.

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## Резюме

Карантинные сорные растения особо вредные виды сорняков, не произрастающие или ограниченно распространенные на данной территории, но с большим потенциальным ареалом возможной натурализации. Завезенные сорные растения часто более агрессивны в новых условиях обитания, чем на родине, где их распространение ограничивается болезнями, вредителями и другими биологическими факторами. Новые сорняки могут быть завезены с семенным материалом, продовольственным зерном, растением, сырьем и т.п. Для ограждения сельского хозяйства от заноса карантинных сорных растений и их распространения во многих странах разработаны специальные карантинные мероприятия.

## Summary

Quarantine, invasive weed plants are most dangerous type of weeds distribution are restricted in special area, but their spread might occupy a major area. Imported weed plants are often more aggressive in new conditions as compare to homeland, where their distribution are limited with diseases, insects and additional biological factors. New types of weeds might be transported via seeds, plants, raw materials and e.t.c. In order to limit their distribution in agricultural fields in many countries are developed special quarantine events.



In the given article we describe agricultural yield contaminated with quarantine objects (invasive weed) in Almaty, Karasay region for 2012-2014. As results of quarantine monitoring analysis in Karasay region agricultural crops are contaminated dominantly with three species of weeds and indicated a different dynamic distribution in the given area.