INVASIVE SPECIES HANDBOOK (EK 013)

WHAT IS AN INVASIVE SPECIES?

Living beings that are not found in the natural flora or fauna of a certain geographical region and are intentionally or accidentally brought from outside for a certain purpose; therefore, they are not included in the "native species" or their seeds, eggs, spores or other biological materials that have the ability to reproduce can be defined as "Alien Species" or "Exotic Species".

Among the Alien Species that have entered through various means, species that pose a threat to human health, cause economic or environmental/ecological problems and/or are likely to cause harm are called "Invasive Alien Species". Considering the increasing number of invasive alien species, their spreading speed and the problems they create, it can be predicted that they will occupy scientists for the next few centuries.

One of the important groups within invasive alien species is invasive plants. "Invasive Alien Plants" are generally not native species but are species that are brought from outside and can grow very well even in areas outside their natural distribution boundaries. Considering the damage they cause, these species can also be defined as “invasive weeds”, but the main difference between them and other weeds is that they are brought from outside.

Characteristically, these plants are more competitive than other species due to their extremely wide tolerance limits, their adaptability and high reproductive capacity, the absence of any environmental pressure due to the absence of natural enemies in the newly moved region, and their allelopathic effects. For this reason, they grow aggressively in the newly moved regions, spread, and outcompete all other plant species in the area they are moved to. They quickly become dominant in the region and their populations reach epidemic levels. In the newly moved areas, these plants negatively affect the ecosystem's functions/processes and nutrient element cycles, and cause a decrease in the number and density of native species.

Therefore, they negatively affect the diversity of the ecosystem (biotic and abiotic) as a whole. Invasive plants also affect human health, agriculture, forestry, animal husbandry, and fisheries, pose a fire risk, limit the use of drinking and irrigation water, damage infrastructure (such as roads, power lines, drainage channels), and prevent the use of recreational areas.

Therefore, the problems caused by invasive plants are not limited to biodiversity, but cause serious economic losses in many different sectors on a global scale. Although the economic losses caused by invasive plants cannot be determined exactly, it is known that they cause serious economic losses in general.

HOW DO INVASIVE SPECIES SPREAD?

In this new era, which can be described as the "age of man or humanity", mankind is using natural resources unbalanced and irresponsibly in a way never seen before, affecting the biological, chemical and geological cycles of elements such as carbon and nitrogen circulating between land, sea and atmosphere, and disrupting the water cycle. The biggest obstacle or barrier to the spread of species is the distance, which also includes geographical barriers (Oceans, Mountains, Great Lakes, Deserts, etc.).

Today, since these barriers have been eliminated, invaders have had the chance to easily invade the entire earth. The increase in the amount of CO2, which is one of the important factors triggering global warming and climate change, which is a result of the destruction of mankind and one of the most important problems of the age, also appears as a factor that accelerates the dominance of invasive species in natural and agricultural ecosystems.

As a result; The fact that invasives have become such a widespread problem is a result of new conditions that have emerged largely as a result of human interventions/effects, such as the increase in international mobility (trade and tourism, etc.), favorable conditions brought about by climate change, and transformations in land use. Our country is also under an extremely great risk/threat due to its location, geological, climatic and biological diversity, inadequate quarantine measures against invasive plant species, and the favorable environment created by intensive construction activities, etc.

CHARACTERISTIC FEATURES OF INVASIVE WEEDS

- The general features of invasive weeds are listed below.

- They provide superiority over native species in destroyed areas with their high growth rate and short life cycle.
- Increase in photosynthesis rate contributes to rapid growth and early maturation.
- Early maturation allows invasive plants to form seeds and grow before native species.
- Some species complete the period from seed to seed in just a few weeks.
- The spread of seeds in many different ways and effectively allows invasive plants to reach large areas quickly. Thus, the plant also guarantees its vitality.
- In addition to seed reproduction, their ability to reproduce vegetatively provides them with an alternative in reproduction and also contributes to the rapid coverage of the invaded area.
- Early germination/germination of invasive plants and their relatively long green period provide these plants with the opportunity to photosynthesize more effectively and for a longer period of time. This means faster growth and more vegetative/generative development.
- Covering the soil surface with the dense vegetation they create gives invasive plants an advantage in development, reproduction and competing with native species for light.
- Their long-term seed dormancy and ability to germinate at different times ensure that these plants persist in the soil and have seeds ready to germinate continuously. Their intensive production of productive flowers also increases the number of seeds produced.
- Being resistant to grazing gives invasive plants a chance to develop and spread faster than native species.
- Their allelopathic potential gives these plants the chance to prevent the development of plants around them and to remain almost alone (monoculture) in the region through the chemicals they secrete.
- The dense root structure they usually have prevents other plants from establishing in the area, while the dense carbohydrate storage makes it difficult to control the plant.
- The dense root structure they form earlier and faster than native species provides a great advantage for these plants in terms of using water, which is extremely valuable in arid areas.

- As with all invasive alien species, they are not immune to the disease, pest and herbivore pressures found in their homeland in the areas they are newly moved to.

Turkey's invasive species list can be accessed at **i-bil.org**

METHODS OF COMBATING INVASIVE SPECIES

ERADICATION: Eradication means the complete destruction of an invasive plant and all types of propagation tools (seeds, vegetative organs, etc.) in an area. When an invasive plant is detected in an area, the most accurate method is to eradicate that plant. However, this process is quite costly and requires great effort and good planning.

HAND PULLING/HOEING: It is one of the oldest methods used to destroy vegetation that does not require manual pulling and digging. It is done to destroy plants by uprooting them. Care should be taken to ensure that no root pieces remain in the soil. Otherwise, re-ripening may occur even from a small piece. This process is most successfully applied in moist and light soils. Invasive plants with small habitus, without deep root systems or in early development stages can be easily pulled by hand, while large habitus, deep rooted, bush-like plants need to be destroyed by digging from the root system with some tools. These methods can be applied effectively especially in cases where invasive plants are found locally and have not yet spread to large areas.

CUTTING AND MOWING: It is the process of cutting the above-ground green parts of plants with different tools. Plants that lose their green parts do not grow because they cannot photosynthesize. On the other hand, since the cut plants re-sprout, cutting and mowing applications need to be repeated several times in order to obtain successful results.

After each cutting and mowing process, plants spend energy to re-sprout and thus, as a result of several cutting processes, the energy reserves of the plants are depleted and the plant is aimed to be completely destroyed. This process can be applied alone or in combination with other methods and even more effective invasive plant control can be achieved.

MULCHING: Many herbaceous annual plant species can be effectively controlled by covering them. In covered plants, gas exchange activities with the outside slow down or stop. In addition, as a result of covering the plants, photosynthesis is interrupted by preventing light intake and temperature changes affect the plant's metabolism. As a result of all these events, serious problems may occur in the vital activities of the plants and may lead to their death. There are many covering materials for mulching purposes. Black or white polyethylene covers are especially widely used. Mulching should be done for a long time in areas infested with invasive plants. This process can vary from 3-4 months to a few years depending on the extent of the infestation. In this way, it will be possible to destroy plants that have already emerged and also plants that will emerge can be controlled.

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USING COVER PLANT: Another method that can be used effectively in suppressing invasive plants and preventing their spread is cover plant applications. Cover plants should be plants that germinate quickly, grow quickly, have a wide habitus and cover the soil quickly. With such measures taken, it is possible for cover plants to suppress and control invasive plants over time.

CHEMICAL CONTROL: The most common measures used in the control of invasive plants are chemical measures based on the use of herbicides. One of the most important reasons for this is that it does not require high labor force and is easy to apply, and is more effective and economical than other measures. Factors such as the sensitivity of the invasive plant species, development period, ecological requirements, soil structure and moisture, and climatic conditions often significantly affect the performance of herbicides. If the invasive plant is found together with other plants in a natural ecology, it is beneficial to use a selective herbicide as much as possible.

OUR INVASIVE SPECIES PREVENTION GOALS

According to our country's Vision 2023 in the field of agriculture and food, in order to "meet the healthy nutritional needs of the society in sufficient quantity and quality, in economically, ecologically and socially sustainable ways; to be able to compete internationally with increasing productivity in agriculture and agricultural industry", it is necessary to prevent the entry of invasive species into our country, to prevent their spread and to carry out combat activities for sustainable production in sectors such as plant production, forestry, animal husbandry and fishing. This situation is also a necessity for the protection of the environment and human health in our country. Within this framework, the measures implemented and/or targeted by the Ministry against invasive alien species, especially invasive weeds, are listed below.

- To create a database and monitoring system for biological species in our country,
- To conduct comprehensive research on the damages that a plant to be imported into the country may cause and, in this regard, to create a list of invasive species,
- To prevent the entry of invasives into the country through import by making legal arrangements on the subject,
- To conduct awareness studies and take the necessary measures (eradication studies, region-specific struggle, etc.) against invasive species spreading naturally,

- To carry out studies to train the technical staff needed on the subject within the scope of capacity development,

INVASIVE SPECIES IN THE MUĞLA REGION

FISHES

Coptodon zillii **(Tilapya)**

Gambusia holbrooki **(Eastern American Mosquito Fish)**

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Atherina boyeri **(The big-scale sand smelt)**

Oncorhyncihus mykiss **(The rainbow trout)**

Lagocephalus Sceleratus **(The silver-cheeked toadfish / IT IS TOXIC)**

Siganus rivulatus **(The rivulated rabbitfish / IT IS TOXIC)**

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Pterois miles **(The devil firefish / IT IS TOXIC)**

Ruvettus pretiosus **(Oilfish / IT IS TOXIC)**

INVERTEBRATES / REPTILES

***Rapana venosa* (The veined rapa whelk)**

***Trachemys scripta elegans* (The red-eared slider)**

Diadema setosum

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Eurythoe complanata **(Amphinomidae / IT IS TOXIC)**

Macrorhynchia philippina **(IT IS TOXIC)**

Cassiopea andromeda **(Cnidaria / IT IS TOXIC)**

Phyllorhiza punctata **(Cnidaria)**

Rhopilema nomadica **(Cnidaria / IT IS TOXIC)**

PLANTS

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Diplachne fusca

Carpobrotus acinaciformis **(Elands sourfig)**

Ailanthus altissima **(Tree of heaven)**

***Robinia pseudoacacia L. (*Black locust)**

MAMMALS

***Rattus rattus* (The black rat)**

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BIRDS

Psittacula krameri **(The rose-ringed parakeet)**

SOURCE

https://bolge4.tarimorman.gov.tr/Documents/MU%C4%9ELA%20%C4%B0L%C4%B0%20B%C4%B0YOLOJ%C4%B0K%20%C3%87E%C5%9E%C4%B0TL%C4%B0L%C4%B0K%20ENVANTER%20VE%20%C4%B0ZLEME%20PROJES%C4%B0.pdf

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