

Islamic Republic of Iran
Ministry of Jihad-e-Agriculture
National Poplar and Fast-growing Tree Species Commission of Iran

Country Report on poplars and Fast-Growing Tree Species

Period: 2016 to 2019

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and

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I. POLICY AND LEGAL FRAMEWORK

Wood farming in Iran needs a strong organization with executive decision power, that will be achieved through the activities of the national poplar and fast-growing tree species commission. The first national poplar commission in Iran, consisting of representatives from government and private sectors including universities and research institutes, poplar planters, wood industries, insurance, bank was held in 1969. Based on numerous sessions and discussions and ideas of members, in 2007, the title of the NPC was changed to the National Poplar and Fast-growing-tree species Commission. This commission is currently operating under the supervision of the Ministry of Jihad-e-Agriculture to identify potentials and capacities for developing wood farming in order to achieve self-sufficiency in wood production and reducing pressure on the forests. According to the statute, the head of the Forests, Rangelands and Watershed Management Organization is elected as the head of the national commission and the manager of the Forests and Rangelands Research Institute as the deputy.

One of the main pillars of this commission was the formation of 5 specialized groups based on the experiences of other countries and the work of groups in the IPC and their adaptation to scientific, technical and social-economic conditions governing Iranian wood farming. In these specialized working groups, various projects such as the geodesy of poplar plantations areas, identify suitable lands of wood farming in the country, economizing the farm using improved cultivars and new techniques, the efficiency of water and irrigation, using wastewater to develop the wood farming in the country, Promoting the culture of poplar and fast-growing tree species, necessary coordination and assistance with the Agricultural Bank Investment Office for banking facilities, Comprehensive mapping of pests and diseases of poplar was proposed for each of the ecological areas of the country.

In 2013 the government decided to pause the harvesting of North natural Forests. On the other hand, the wood industries had difficulty obtaining wood raw materials. So, the requirement of them should be supplied through import and planting of fast-growing trees. Because of some troubles of importing wood like the capacity of North seaports, quarantine and currency exchange.

The demand for raw wood has led to an increase in wood prices, so most Poplar planters have proceeded to harvest their own private trees. Also, the natural willow located along the rivers has also been illegally harvested.

According to results of 2019, there are 30,000 hectares of indigenous poplars including *P. capsica* located in the Caspian Sea coast and *P. euphratica* in arid and semi-arid regions, as well as alder (*Alnus glutinosa* and *A.subcordata*) that naturally (25716 ha) and planted forests (153966 ha), pure or mixed with Maple, Elm, Hornbeam, Oak, etc. trees in the area of Hyrcanian forests that have a protective aspect and no exploitation is done on it. *P. capsica*

trees are not easily regenerated because their natural habitats are changed. So, there is a serious need for conservation and afforestation of this species.

Currently, there are 37632 hectares of wood farming including *P. deltoides*, *P. euramericana*, *P. nigra*, and *P. alba* (32500 hectares), that located in the northern, northwestern, central, and western parts of the country, as well as *eucalyptus* (5132 hectares) which are scattered in the tropics of the south of the country. This area produces 2.78 million m³ wood per year that could be increased through using improved cultivars, and scientific and technical management of traditional farms.

In order to present a national program based on correct information about the current situation of wood farming in the country, the Forest and Rangeland Research Institute (RIFR) started three studies simultaneously in 2018 as follows:

1. The surveying project of Poplar plantations of different regions of the country using satellite data
2. The project of the quantitative and qualitative status of poplar plantations in the northern, northwestern, northeastern, central, and western regions, with the potential of wood production.
3. Investigation of the regions with wood farming potential that included four subprojects.
 - a) Identification of suitable regions along the permanent rivers for wood farming
 - b) Identification of suitable regions of wood farming in the plains of the north of the country.
 - c) Determination of suitable lands for wood farming using wastewater around the metropolitan.
 - d) Identification of suitable regions of wood farming with *Eucalyptus* species in tropical provinces.

In late of 2019, according to the needs of massive industries to wood raw materials, the Forests, Rangelands and Watershed Management Organization (FRWO), as the custodian of wood farming, in cooperation with the Forests and Rangelands Research Institute (RIFR) prepared the national wood farming program.

Some necessary of performance of national wood farming program included conserving forest resources, implement of forest protection management plan, increasing demand of wood products in the community, helping local communities and job creation, and restriction of imports. In this national document, the program of wood farming using poplar and Eucalypt species is predicted for the next ten years. Also, in this project the production of seedlings of fast-growing tree species, private sector cooperation, financial incentives and subsidies are considered.

The executive plan of development of wood farming is pursued in two axes, included qualitative and quantitative development which has its own executives and functions. The Forest and Rangeland Research Institute will carry out the development of quality and increase of yield per unit area of wood farming. Quantitative development is mainly done

under the supervision of the Forests, Rangelands and Watershed management Organization with the participation of producers and wood consuming industries.

Actions and policies of the wood farming program

- a) **Increase of the cultivation area:** use of the margin of permanent rivers provided that the ownership dispute between the Forests, Rangelands, and Watershed management Organization and the Ministry of Energy is resolved), lands owned by government agencies, organs, and organizations, the lands of industrial estates, suburban lands using wastewater, the margins of farms, windbreaks, and private farmland.
- b) **Increase of production per area:** use of Poplar species and fast-growing trees with high yield and acclimation, considering the technical principles of planting through training and promotion.
- c) **Encouragement support requirements:** upgrade of organizational structure, the formation of wood farmers' cooperatives, offer the long-term facilities with low-interest via the government, providing free plant breeding for farmers, concluding contracts between wood producers and industries of wood and paper, insurance coverage of products through subsidies of Government, supporting of applied research projects to improve the productivity of wood cultivation throw the owners of wood and paper industries.

II. TECHNICAL INFORMATION

1. Taxonomy, Nomenclature and Registration

Research Institute of Forests and Rangelands (RIFR) released one of *P. deltoides* clone at 2016 after adapting in the nursery and planting at different distances called “Gildar”, and also, in 2019 a non-native *P. nigra* clone as known "Alborz" was released.

The highest yield of wood in north of Iran (Gilan province) belonged to “Gildar clone” with the average of $35 \text{ m}^3 \text{ ha}^{-1} \text{ year}^{-1}$, while “Alborz” clone attained the best results for wood production ($31 \text{ m}^3/\text{ha}/\text{yr.}$) in regions of northwestern, western and central provinces.

2. Domestication and Conservation of Genetic Resources

The fast-growing tree species culturing for the production of wood, are mainly species of Poplar and Eucalypt that supply through private sector. About 30% of Poplar plantation area was located in North of country along the coastal plain of the Caspian sea (Fig1) that include clones of (*P. deltoides*) and (*P. euramericana*) and the rest of it was located in arid and semi-arid climates with clones of (*P. nigra*) and (*P. alba*).

In order to the protection of forest resources, harvesting of species like *P. caspica* and *P. euphratica* is legally prohibited. To preserve and development of improvement clones, the mother garden is established.

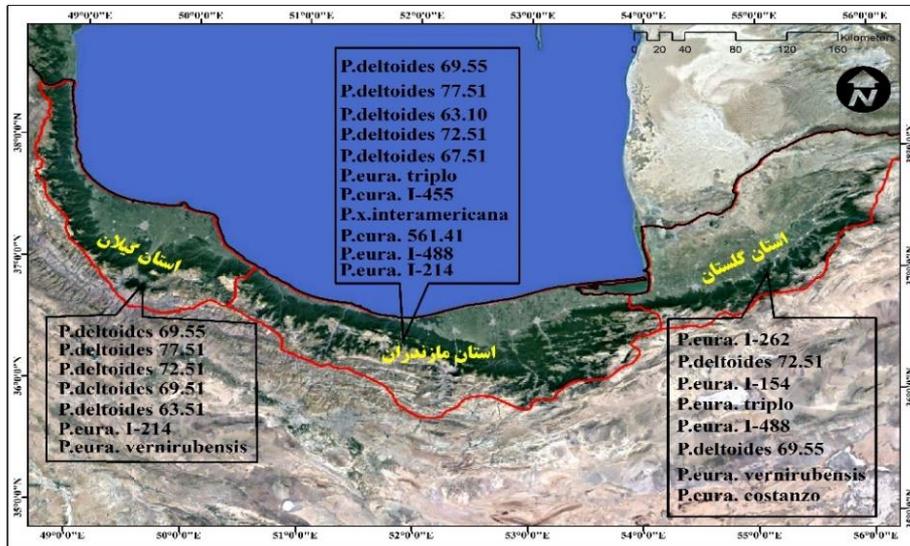


Fig1. Introducing high-yielding and compatible poplar clones in the northern provinces of the country

“*Eucalyptus camaldulensis*” is a species that is planted in tropical regions like Khuzestan, Hormozgan and Bushehr provinces. These provinces are suitable regions for planting and development of some of *Eucalyptus* species.

Willow species included *S. excelsa*, *S.alba* ‘*S. acmophylla*’ ‘*S. caramanica*’ ‘*S. caprea*’ ‘*S. aegyptiaca*, etc. that grow naturally in the margin of permanent rivers of the country and they play an important role in protecting the river's banks. pussy willow is generally cultivated in some provinces of Iran for hedge and ornamental purposes. The distillate obtained from the inflorescence of plants, with the common local name "Araghe Bidmashk", has been used and sold in most parts of Iran for a long time. Unfortunately, in recent years, willow trees have been illegally harvested in natural habitats for using wood, although the “Forests, Rangelands and Watershed management Organization (FRWO)” guards are working hard to prevent.

Alder is one of the native trees of Hyrcanian forests. *Alnus glutinosa* is planted in the plains of the northern coastal strip and *A. subcordata* is planted in the lowlands of the Hyrcanian forests mixed with Oak, Maple, Elm, Hornbeam, and Honey locust trees, with the aim of natural regenerating of the lowland forests.

Alder as a nurse tree plays an important role in the establishment of other forest species and causes regenerate natural forests in a long time.

3. Plant Health, Resilience to Threat and Climate Change

Iran is located in the arid belt, that climate change, global warming, and water levels are a serious challenge to the development of wood farming, especially in arid and semi-arid regions. Studies have shown that 36% of Poplar plantations located in margin rivers, irrigated

in the form of flooded, which greatly increases water consumption. The Office of Education and Promotion attempt to increase water productivity by teaching irrigation systems and appropriate planting methods.

Due to water restrictions, the production of Poplar and fast-growing tree species with drip irrigation systems is expanding, and the government is supporting this type of irrigation system in order to increase water efficiency. Since poplar clones (especially *P. deltoides*, *P. euramericana* and *P. nigra*), have high adaptation in climatic conditions with less moisture and rainfall and also have a high yield of wood production, so they are in the main priority.

Another factor that has prevented the development of wood farming is the competition between agricultural and horticultural products and wood products. Farmers prefer to cultivate their land with crops that are harvested annually and the return on investment is shorter.

4. Sustainable Livelihoods, Land use, Products and Bioenergy

Forest and Rangeland Research Institute performed the project of monitoring of poplar plantations of country in 2018. There is more than 5 million capacity of poplar rooted cuttings production in Gilan and Mazandaran provinces that supply with the government nurseries and private sector participation.

The most productive of rooted cuttings especially *P. nigra* clones, outside of the north is observed in West Azerbaijan province with more than 20 centers to sell poplar rooted cuttings. In the provinces outside of the of north, poplar clones cultivated are often non-native from Turkish and Europe origins like *P.n. 62/135*, *P.n. 56/72*, *P. n. betulifoila*. While clones of *P. deltoides* and hybrid *P. euramericana* are often spread in the northern provinces (Gilan, Mazandaran, and Golestan) and *P. alba* is mostly widespread in Chaharmahal-Bakhtiari and Isfahan provinces and less extent in other provinces.

In the north of Iran rooted cutting of *P. deltoides* and *P. euramericana* planted with a distance of 3×3 m and in the provinces of outside the north, the rootless cuttings of *P. nigra* and *P. alba* planted with a distance of 1×1, 2×1, 3×1 m.

Poplar trees are planted around of farmlands where is main stream for irrigation for windbreak and wood production. So, in addition to a protective role, the poplar trees provide wood and increase the farmer's income.

Eucalypt planting around of farmlands due to the allopathic problem of eucalypt trees and its negative impact on agricultural and forage crops is less than poplar.

In small lands of the northern, northwestern and western parts of the country, poplar and fast-growing tree species planted for producing wood. According to characteristics of poplar trees, in Iran integrated farming system (agraroforestry) is an ideal approach for developing wood farming and improve economic efficiency and Livelihoods conditions of farmers.

In different parts of the country, in the early years of trees cultivation, before the expansion of their crowns, some crops such as wheat, alfalfa, peanuts, etc. are planted in the space between

the trees. Since alfalfa is a perennial plant and no need for annual plowing, replanting, and soil fertilizing so the farmers of western and northwestern regions interested to cultivate the alfalfa between poplar trees.

selling poplar woods is based on the kilogram of fresh weight (88%) or standby and entirely (12%).The standby and entirely method is common in mountainous areas that far away from wood industries. Wood brokers buy poplar trees at low prices and sell it to small local industrial workshops.

In Iran, due to the presence of fossil fuels, the wood of fast-growing trees not used as bioenergy .So, most of the wood is used in wood factories (such as, MDF, paper pulp) located in the northern provinces (Gilan and Mazandaran), and also some wood is used by local workshops such as pallet making, furniture, etc.

In the most Poplar plantations, soil fertilization is either not done or limited to the use of artificial manure during tree planting. Among poplar plantations, 82% of pests belonged to the group of phytophagous and suckers, such as aphids and lice, and 18% were xylophagous. The irrigation of Poplar trees in the eastern regions were carried out 6-8 times in a year, and in the western regions of the northern coastal areas, the plantations were non irrigation. Water Source for irrigation of poplar trees in outside the north is rivers (70.4%), well (25.2%) and springs or aqueducts (4%).

5. Environmental and Ecosystem Services

Because of climate change and decreasing water resources, the use of wastewater (surface runoff and wastewater) in large cities is one of the policies of the National Wood farming Development Program. According to the investigation of ten big cities, the capacity of wastewater support about 78000 hectares to plant fast-growing tree species like Poplar and Eucalypt for wood production. At the present time, farmers in the outskirts of the big cities use the wastewater to irrigate crops and fodder. Since the use of wastewater for crops used by humans has a legal ban so, in the National Wood farming Development Program, in coordination with other relevant organs, the patterns of cultivating changed to wood production.

Planting trees in the farm margin in the main irrigation route has been common for many years. These plants are used as a windbreak and considered a source of economic income for farmers. The Poplar trees with the proper diameter are harvested and sold.

III. GENERAL INFORMATION

1. Administration and Operation of the National Poplar Commission or equivalent Organization

For preparation and compilation of the program of national wood farming, several meetings were held with the presence of the head of the National Poplar and fast-growing tree species Commission and deputy officials and experts in this field.

Also, in 2018, the head of Forests, Range and Watershed management Organization (FRWO) selected someone as an executor of wood farming development to implement the wood farming programs and goals.

2. Literatures

Abravesh, Z., Assareh, M.H. and Emam, M., 2019. Micropropagation of *Eucalyptus citriodora* H. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 27 (1): 86-97 (In Persian).

Ahmadi, A., Bayat, H. and Tavakoli Neko, H., 2017. Morpho-physiological Responses of Euphrates Poplar (*Populus euphratica* Oliv.) Seedlings to salinity stress in greenhouse conditions. *Iranian Journal of Forest and Poplar Research*, 25 (1): 127-136 (In Persian).

Ahmadi, P., Efhamisisi, D., Pourtahmasi, K. and Izadyar, S., 2019. The investigation of physico-mechanical characteristics of poplar wood impregnated with melamine formaldehyde resin. *Journal of Forest and Wood Products*, 72 (3): 249-261.

Ahmadloo, F. and Ghassemi, R., 2018. Introduction of high wood production poplar clones for cultivation in the west and northwest regions of the country. *Iran Nature*, 3 (4): 58-69 (In Persian).

Ahmadloo, F., Calagari, M., Salehi, A. and Goodarzi, Gh., 2018. Investigation of rooting and growth characteristics of poplar clones in hydroponic and soil cultures. *Journal of Forest Science*, 64 (5): 207-215.

Alimohamadi, A. and Asadi, F., 2019. Study of growth function of black poplar (*Populus nigra*) With Kermanshah and Zanzan origin in Karaj research station, *Ecology of Iranian Forest*, 7 (14): 80-89 (In Persian).

Alipoor, M., Asadpur Atouei, Gh., Majid Zabihzadeh, S. and Ghazvini, Z., 2016. Effects of *Populus deltoids* chips washing pre- treatment method on CMP optical and strength properties. *Iranian Journal of Wood and Paper Science Research*, 31 (3): 375-387 (In Persian).

Amin Amlashi, M., 2019. The effect of fertilizer on vegetative traits of *Populus deltoides* Marsh. saplings and the rate of their resistance to pests and diseases in Kiashshahr nursery. *Iranian Journal of Forest and Poplar Research*, 26 (4): 565- 576 (In Persian).

Asadi, F. and Alimohammadi, A. 2018. Evaluation the growth and production function of seven species of Salicaceae in first growth season, *Ecology of Iranian Forest*, 6 (11): 51-60 (In Persian) .

Asadi, F. and Alimohammadi, A. 2019. Assessing the performance of *Populus caspica* and *Populus alba* cuttings under different irrigation intervals. *Agriculture & Forestry*, 65 (2): 39-51.

Asadi, F. and Khodakarimi, A., 2016. Hedgerow intercropping of *Populus alba* and alfalfa in West Azarbayjan Province, Iran. *Iranian Journal of Forest*, 8 (1): 51-65 (In Persian).

Asadi, F., 2019. Effect of spacing on the yield in intercropping of poplar and alfalfa (case study: Alborz Research Station, Karaj, Iran). 4th World Congress on Agroforestry. Montpellier, France, 20-22 may.

Asadi, F., 2019. Fundamentals of poplar wood farming. Publication of Research Institute of Forests and Rangelands of Iran, No. 495, Tehran, 245p (In Persian).

Asadi, F., Espahbodi pardkolaei, K. and Sadati, S.E., 2019. Evaluation of technical defects of poplar farming in Mazandaran province. *Iranian Journal of Forest*, 11 (3): 401-414 (In Persian).

Asadi, F., Mirzaie Nodoushan, H. and Mokhtari, j., Comparison of *Populus caspica* growth behavior and their progenies. *Journal of Forest and Wood Products*, 69 (4): 713-727 (In Persian).

Asadzadeh, F. and Barin, M., 2016. Modeling of copper removal from aqueous solution by *Populus nigra* sawdust using central composite design. *Journal of Wood and Forest Science and Technology*, 23 (3): 145-163 (In Persian).

Asadzadeh, F. and Barin, M., 2016. Modeling of Copper removal from aqueous solution by *Populus nigra* sawdust using central composite design. *Wood and Forest Science and Technology*, 23 (3): 145-164 (In Persian).

Babmorad, M., Kajbaf Vala, Gh.R. and Zeinali, S., 2019. Faunestic survey of the pests and natural enemies associated with Euphrates poplar in Khuzestan province. *Iranian Journal of Forest and Range Protection Research*, 17 (1): 40-63 (In Persian).

Bagheri, R., Ghasemi, R., Calagari, M. and Merrikh, F., 2016. Comparative study of poplar yield of different cultivars as influenced by irrigation interval in Karaj. *Iranian Journal of Forest and Poplar Research*, 23 (4): 732-742 (In Persian).

Barazandeh, M.M., Mahdavi, S. and Fakhryan, A., 2017. Evaluating the rate equation of delignification reaction of *Populus deltoides*. *Iranian Journal of Wood and Paper Science Research*, 32 (1): 25-32 (In Persian).

Barshan, M., Tabari Kouchaksaraei, M., Sadati, S.E. and Shahhoseini, R., 2016. Growth and survival of willow seedling (*Salix alba* L.) under water deficit stress. *Journal of Forest and Wood Products*, 69 (2): 249-257 (In Persian).

Bayatkashkoli, A., Hemmati, T. and Shamsian, M., 2016. Evaluation of using compressed poplar wood in manufacturing of wooden chairs. *Journal of Forest and Wood Products*, 69 (2): 351-359 (In Persian).

Bozorgmehr, A., Modirrahmati, A, Ghasemi, R. and Calagari, M., 2019. The introduction of successful poplar clones in the northeast of the country. *Iran Nature*, 4 (2): 51-63 (In Persian).

Calagari M., Mirzaie Nodoushan, H. and Asadi, F., 2016. Growth characteristics of *Populus euphratica* seedlings from superior genotypes in research station of Karaj. 25th session of International Poplar commission, Berlin, 13-16 Sep.

- Calagari, M., 2018. Ecological characteristics of *Populus euphratica* in natural habitats of Iran and its potential use in wood farming. *Iran Nature*, 3 (1): 22-30 (In Persian).
- Calagari, M., 2018. Introduction of high wood production poplar clones for cultivation in the north of country. *Iran Nature*, 3 (2): 50-58 (In Persian).
- Calagari, M., Bagheri, R. and Ghasemi, R., 2017. Technical instructions for planting, tending and harvesting poplar plantation. Agricultural Research, Education and Extension Organization (AREEO) 78p (In Persian).
- Calagari, M., Ghasemi, R. and Bagheri, R., 2016. Growth assessment of F1 hybrid *Salix* seedlings in Karaj experimental site. *Iranian Journal of Forest and Poplar Research*, 24 (1): 140-149 (In Persian).
- Calagari, M., Ghasemi, R., Asadi, F. and Bagheri, R., 2018. Promotion of wood production of some poplar clones using sprouts management in Karaj. *Iranian Journal of Forest*, 10 (1): 79-88 (In Persian).
- Calagari, M., Mirzaie-Nodoushan, H., Asadi, F. and Salehi Shanjani, P., 2017. Evaluation of progenies of sexual reproduction of *Populus euphratica* provenances using leaf morphology and Isoenzyme markers. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 25 (2): 247-258 (In Persian).
- Calagari, M., Modirrahmati, A., Mirzaie Nodoushan, H. and Asadi, F., 2016. Growth characteristics of *Populus euphratica* seedlings trees in Research Station of Alborz, Karaj. *Iranian Journal of Forest*, 7 (4): 471-483 (In Persian).
- Calagari, M., Salehi Shanjani, P. and Banj Shafiei, Sh., 2017. Growth comparison of two poplar species (*Populus alba* and *Populus euphratica*) and their hybrid in the saline and non-saline soils. *Journal of Plant Research (Iranian Journal of Biology)*, 30 (1): 143-154 (In Persian).
- Changizi, R, Moradi, M. and Basiri, R., 2019. Interception of pure *Populus euphratica* stand in Maroon riparian forest of Behbahan. *Forest Research and Development*, 5 (3): 469-481 (In Persian).
- Darvishsefat, A., Arjhangi Choobar, R., Bonyad, A.E. and Ronod, Gh., 2016. Mapping the poplar plantations using Landsat-8 data (Case Study: Talesh and Sumehsara region, Guilan province). *Iranian Journal of Forest*, 8 (3): 301-312 (In Persian).
- Dehghan, M., Moshki, A. and Mollashahi, M., 2016. Comparative evaluation of Cd and Zn uptake by two eucalyptus species. *Iranian Journal of Forest and Range Protection Research*, 14 (1): 22-33 (In Persian).
- Dehghan, M., Moshki, A., Mollashahi, M. and Salahi A., 2018. Investigation of two *Eucalyptus* species (*Eucalyptus microtheca* , *Eucalyptus camaldulensis*) in absorbing Cu and Pb from soil. *Journal of Plant Research (Iranian Journal of Biology)*, 31 (3): 642-654 (In Persian).
- Efhamisisi, D. and Ahmadi, P., 2018. Effect of the beeswax and its combination with boric acid on the dimensional stability and fungal resistance of poplar wood. *Journal of Forest and Wood Products*, 71 (2): 173-184 (In Persian).

- Efhamisizi, D., Karimi, A.N., Pourtahmasi, K. and Asadi, F., 2017. The relationships between fiber dimensions and growth rate in *Populus nigra*. *Wood and Forest Science and Technology*, 23 (2): 169-184 (In Persian).
- Emami, A.S., Tabari Kouchaksaraei, M., Bahramifar, N. and Salehi, A., 2016. Tolerance of *Populus euramericana* 561/41 to different concentrations of lead. *Iranian Journal of Forest and Poplar Research*, 24 (3): 496-506 (In Persian).
- Esmaeeli, N., Ghorbani M. and Beparva P., 2016. Comparison the performance of different catalysts in chemical modification of poplar wood with glutaraldehyde. *Iranian Journal of Wood and Paper Industries*, 7 (3): 363-375 (In Persian).
- Esmaeeli, N., Ghorbani M. and Beparva P., 2016. Effects of the combined modification process of glutaraldehyde/ paraffin on biological and mechanical properties of poplar wood. *Iranian Journal of Wood and Paper Science Research*, 31 (4): 606-620 (In Persian).
- Esmaeeli, N., Ghorbani, M. and Beparva, P., 2016. Determinating the optimum conditions of poplar wood chemical modification using glutaraldehyde and physical properties of the product. *Iranian Journal of Wood and Paper Science Research*, 31 (2): 211-223 (In Persian).
- Faal Khah, I., Ramezani Kakroudi, E., Alijanpour, A. and B.Shafiei, A., 2017. The Effect of spacing on quantitative and qualitative characteristics of black poplar (*Populus nigra* L.). *Forest Research and Development*, 2 (4): 337-351 (In Persian).
- Falahchai, M.R., Salehi, A., Shahmagsoud, M., Ghorbazineh, N. and Hemmaty, V., 2018. The effect of distance and decay degree of *Populus caspica* Bornm. dead trees on some soil chemical properties. *Iranian Journal of Forest*, 10 (2): 197-205 (In Persian).
- Fallahchai, M.M., Salehi, A. and Mardalizad, Gh., 2016. Natural Regeneration of (*Populus caspica* Bornm.) and its relationship with soil physical and chemical properties (Case Study: Safrabaste Region in East of Guilan province). *Journal of Plant Research (Iranian Journal of Biology)*, 29 (1): 118-129 (In Persian).
- Farashiani, M.E., Muhamad Awang, R., Assareh, M.H., Omar, D. and Rahmani, M., 2016. Fumigant toxicity of 53 Iranian Eucalyptus essential oils against stored product insect, *Sitophilus oryzae* L. *Iranian Journal of Forest and Range Protection Research*, 13 (2): 132-139 (In Persian).
- Farhoudi, R., 2016. Effect of *Eucalyptus camaldulesis* alcoholic extract on antioxidant enzyme activities, sucrose synthesis enzymes and cell membrane damage of *Xanthium strumarium* seedling. *Journal of Plant Research (Iranian Journal of Biology)*, 28 (5): 1077-1087 (In Persian).
- Ghadiripour, P. and Bavi, S., 2018. Riparian forests of Khuzestan province, the forgotten forest ecosystems in Iran. *Iran Nature*, 2 (6): 16-23 (In Persian).
- Ghadiripour, P., Calagari, M., Saleheh Shushtari, M.H. and Esmailzadeh, O., 2016. Studying the growth and morphological characteristics of euphrate poplar and white poplar hybrids in experimental nursery of Khuzestan Province. *Journal of Forest and Wood Products*, 69 (1): 73-85 (In Persian).

Ghahramani, S., Hedjazi, S. and Mahdani, S., 2017. Development of poplar Kraft pulp strengths with cellulose nano fiber of rice straw. *Journal of Forest and Wood Products*, 70 (1): 157-165 (In Persian).

Ghamari Zare, A. and Ghadiri Sardrood, S., 2016. The effect of six plant growth regulators on somatic embryogenesis in *Eucalyptus rubida*. *Journal of Plant Research (Iranian Journal of Biology)*, 29 (2): 415-425 (In Persian).

Ghorbani M., Mokhtari J., Sadati S.E. and Sohrabi H., 2017. Comparison of stand and soil characteristics of pure and mixed plantations of *Populus deltoides* and *Alnus subcordata* (case study: Chamestan, Mazandaran province). *Journal of Forest and Wood Products*, 69 (4): 767-776 (In Persian).

Goodarzi, G.R. and Ahmadloo, F., 2018. Investigation on adaptability and performance of species and provenances of *Eucalyptus* in Markazi province (Saveh). *Iranian Journal of Forest and Poplar Research*, 25 (4): 634-645 (In Persian).

Goodarzi, Gh. and Ahmadloo, F., 2018. Investigation on adaptability and performance of four species and provenances of *Eucalyptus* in Markazi province (Mahalat). International Conference on Society and Environment, 2 September, University of Tehran, 1-9 p.

Goodarzi, Gh. and Ahmadloo, F., 2019. Introduction of suitable poplar clones in the poplar research, Markazi province. *Iran Nature*, 4 (3): 27-35 (In Persian).

Hajjarian, M. and Hosseinzadeh, O., 2016. The role of educational and promotional activities on the performance of poplar farmers in Urmia. *Forest Research and Development*, 1 (3): 241-255 (In Persian).

Hajjarian, M., 2017. Estimating stumpage price function for improved black poplar clones using hedonic pricing method in Urmia. *Wood and Forest Science and Technology*, 23 (2): 105-122 (In Persian).

Hasanvand M. and Fayyaz P., 2016. Impacts of night late frost on photosystem II components of three black poplar (*Populus nigra* L.) clones. *Iranian Journal of Forest and Poplar Research*, 24 (3): 428-438 (In Persian).

Heidari Safari Kouchi, A., Iranmanesh Y. and Rostami Shahraji, T., 2016. Above-ground and soil carbon sequestration of white poplar (*Populus alba* L.) species in four different planting spaces in Chaharmahal and Bakhtiari Province. *Iranian Journal of Forest and Poplar Research*, 24 (2): 200-213 (In Persian).

Heidari Safari Kouchi, A., Rostami Shahraji, T., Iranmanesh, Y. and Moradianfard, F., 2016. Comparison of product, biomass and kinds of wood consumption of white poplar (*Populus alba* L.) in four plant spacing. *Iranian Journal of Forest*, 8 (2): 141-152 (In Persian).

Hesami, S.M. and Asadi F., 2016. Variations in vegetative traits of white poplar (*Populus alba* L.) For wood farming in riverbanks of Zayandehrood river in Isfahan. *Iranian Journal of Forest and Poplar Research*, 24 (3): 520-528 (In Persian).

Hesami, S.M., Calagari, M. and Ghorbani e Kahrizangi, M., 2019. Study of growth and morphological characteristics of euphrates poplar (*Populus euphratica* Oliv.) provenances in

Shahid Fozveh experimental nursery. *Forest Research and Development*, 5 (3): 483-496 (In Persian).

Hosseinzadeh, J., 2017. Comparison of the growth of industrial *Eucalyptus* species and cultivars in tropical region of Mehran. *Journal of Forest and Wood Products*, 70 (1): 83-91 (In Persian).

Iranmanesh, Y., Ghamari Zare, A., Talebi, M. and Jahanbazi Goujani, H., 2017. Investigation of quantitative and qualitative characteristics of interspecific hybrids between two poplar species (*P.alba* and *P.euphratica*) in Chaharmahal and Bakhtiari province. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 25 (2): 348-357 (In Persian).

Jafari Mofidabadi, A., Ghameri-Zare, A. and Iranmanesh, Y., 2016. Yield evaluation of new interspecific poplar hybrids introduced to Chaharmahal and Bakhtiari province for poplar plantation. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 24 (2): 243-248 (In Persian).

Jahanpour, F., Badehian, Z. and Soosani, J., 2019. Investigating the efficiency of the carbon sequestration in above-ground biomass of some populous clones. *Iranian Journal of Forest*, 11 (2): 195-205 (In Persian).

Jahanpour, F., Derikvandi, A., Ramak, P., Ghasemi, R., Calagari, M. and Karamian, R., 2019. Investigation on adaptation and growth characteristics of different closed-crown poplar clones under climatical conditions of Khorram Abad. *Iranian Journal of Forest and Poplar Research*, 26 (4): 471-482 (In Persian).

Jahantigh, M., 2017. The effect of combined engineering structure on reducing water use of *Eucalyptus* plantations in Sistan plain. *Iranian Journal of Forest*, 9 (3): 333-343 (In Persian).

Keybondori, S., Majnounian, B., Abdi, E., Yousefzadeh, H. and Deljouei, A., 2018. Assessing spatial changes of roots tensile strength of *Salix purpurea* L. in riparian zone of Karun (Case study: Susan plain in Khuzestan province). *Iranian Journal of Forest and Poplar Research*, 26 (1): 70-80 (In Persian).

Khalife Soltanian, F., Kiani, B., Hakimi Meybodi, M.H. and Tabande Saravi, A., 2016. Comparing growth and success of eldarican pine (*Pinus eldarica* Medw.) in pure and mixed stands with river red gum (*Eucalyptus camadulensis* Dehnh.) in Shahid-Paidar Park, Ardakan. *Iranian Journal of Forest and Poplar Research*, 24 (3): 549-558 (In Persian).

Khosravan, S., Mirzaie-Nodoushan, H., Ghamari Zare, A. and Ebrahimi, M.A., 2017. Different responses of poplar inter-specific hybrids to micropropagation. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 25 (1): 43-56 (In Persian).

Kiaei, M., 2017. The effect of initial spacing on wood density and biometric properties of fibers in *Populus deltoids* (Case study in Sari region). *Wood and Forest Science and Technology*, 24 (4): 101-116 (In Persian).

Lashkarbolouki, E. and Kahneh, E., 2016. Seedling production of natural hybrid of poplar trees and usage them in comprehensive program of wood farming. *Forest Research and Development*, 1 (4): 307-317 (In Persian).

- Lashkarbolouki, E., Ghasemi, R., Mosavi Kopar, S.A., Kahneh, E. and Amanzadeh, B., 2018. Study on phonology and growth characteristics of new poplars clones in Safrabasteh, Gilan province. *Iranian Journal of Forest and Poplar Research*, 26 (1): 48-59 (In Persian).
- Lashkarbolouki, E., Kahneh, E., Mosavi Kopar, S.A. and Amanzadeh, B., 2017. Adaptability of new open crown poplar clones in Lasht-e Nasha area, Gilan province. *Iranian Journal of Forest and Poplar Research*, 24 (4): 655-646 (In Persian).
- Maasoumi babaarabi, M., Basiri, R., Moradi, M. and Kiani, B., 2018. Spatial pattern of *Populus euphratica* in pure and mixed stands of Maroon, Behbahan. *Journal of Plant Research (Iranian Journal of Biology)*, 30 (4): 927-939 (In Persian).
- Madhoushi, M., Mojerian Galogahi, V. and Masteri Farahani, M., 2018. Assessment of decay in poplar and beech by using of x-ray non-destructive method. *Iranian Journal of Wood and Paper Science Research*, 33 (1): 112-121 (In Persian).
- Maghsoudloo, S., Mahboobi, M.R, and Abedi Sarvestani, A. 2017. Investigation of the factors affecting the knowledge needs of *Eucalyptus* growers in Golestan Province. *Iranian Journal of Forest*, 9 (3): 345-360 (In Persian).
- Minaeimoghadam, M., Askarianzadeh, A., Shojaei, M., Abbasipour, H., Larijani, K. and Imani, S., 2017. Identification and study of environmental factors affecting the infestation of babylon weeping willow trees to the clearwing moth, *Paranthrene diaphana* (Lep.:Sesiidae) in Tehran. *Iranian Journal of Forest and Range Protection Research*, 15 (1): 67-75 (In Persian).
- Miri, M., Ghasemian, A., Resalati, H. and Zeynali, F., 2016. Investigation on producing the bleachable kraft pulp from *Populus deltoids*. *Wood and Forest Science and Technology*, 23 (1): 133-148 (In Persian).
- Mirzaei, J.,Moradi, M. and Seyedi, F., 2016. Carbon sequestration in the leaf, litter and soil of *Eucalyptus camaldulensis*, *Prosopis juliflora* and *Ziziphus spina-christi* Species. *Ecopersia*, 4 (3): 1481-1491.
- Mirzaie Nodoushan, H., Khosravan, S., Ghamari Zare, A. and Ebrahimi, M.A., 2017. Investigation of rooting ability of poplar interspecific Hybrids (*Populus alba* x *P. euphratica*) through apical meristem culture. *Journal of Wood and Forest Science and Technology*, 24 (2): 59-71 (In Persian).
- Moayeri, M.H., Hatami, N. and Tabarsa, T., 2018. Evaluation of quantitative and qualitative characteristics of *Paulownia fortunei* cultivation on steep lands (Case study: Tooskestan region–Gorgan). *Forest Research and Development*, 8 (4): 97-112 (In Persian).
- Modirrahmati, A., 2017. Short-term poplar harvesting system (short-rotation system); the true meaning of wood farming. *Iran Nature*, 2 (1): 16-20 (In Persian).
- Mohammadi, A. and Moayeri, M.H., 2016. Determining the harvest age (economic) of even-aged stands of *Paulownia* plantation in Dr. Bahramnia's Forestry Plan. *Wood and Forest Science and Technology*, 23 (2): 203-224 (In Persian).
- Mohammadi, J., Mohammad Ali Pormalekshah, A.A., Hatami, N., 2019. Allometric equations for estimating aboveground biomass for *Paulownia* trees (*Paulownia fortunei*) in

the Dr. Bahramnia Forests Plan of Gorgan. *Journal of Forest and Wood Products*, 71 (4): 303-313 (In Persian).

Mokhtari, J., Soltani, A., Tabari Kocheksaraee, M. and Sadati, E., 2018. Quantitative and qualitative study and index choice to compare four eastern cottonwood (*Populus deltoides* Bartr. ex Marsh) stands in Gilan and Mazandaran. *Iranian Journal of Forest and Poplar Research*, 26 (3): 368-381 (In Persian).

Mokhtari, j., Soltani, A., Tabari Kouchaksaraei, M. and Sadati, E., 2017. Effect of soil texture on growth and yield of eastern cottonwood (*Populus deltoides* bartr. ex marsh. 77/51) in Noor alluvial plain. *Iranian Journal of Forest and Poplar Research*, 25 (3): 398-407 (In Persian).

Moradi Behbahani, S., Moradi, M., Basiri, R., Mirzaei, J., 2017. Arbuscular mycorrhizal fungi symbiosis with *Populus euphratica* Oliv in riparian forest and its correlation with soil physiochemical properties. *Wood and Forest Science and Technology*, 24 (1): 17-28 (In Persian).

Mustafa, M., Parsakhoo, A., Shataee Joybari, Sh., Lotfalian, M. and Hatami, N., 2016. Comparison of economic performance of two the traditional transportation systems on poplar and willow timbers (case study: Kurdistan province) *Wood and Forest Science and Technology*, 22 (4): 103-122 (In Persian).

Nashveh, M., Nazeri, S. and zafari, D., 2018. Antibacterial activity of balsam and propolis from *Populus deltoides*. *Journal of Plant Research (Iranian Journal of Biology)*, 31 (2): 398-408 (In Persian).

Nikkhah Shahmirzadi, A., Ghorbani, M. and Amininasab, S.M., 2016. Determination the optimal conditions of poplar wood treatment with maleic anhydride and physical characteristics of the product. *Wood and Forest Science and Technology*, 23 (3): 221-240 (In Persian).

Oladi, R., Heidari, L., Bagheri, R. and Pourtahmasi, K., 2018. Effect of different irrigation regimes on wood anatomical features and fiber biometry of two elite poplars. *Wood and Forest Science and Technology*, 25 (2): 153-164 (In Persian).

Peyrov, S., Sosani, J., Jalilvand, H. and Pirikia, M., 2017. Evaluation of growth of trees using drip and furrow irrigation systems. *Journal of Plant Research (Iranian Journal of Biology)*, 30 (2): 280-290 (In Persian).

Poladi, M., Sharifi, S.H., Zabihzadeh, S.M. and Nikkhah Dafchahi, M., 2019. Efficiency of response surface methodology to determine effective factors on production process of carboxymethyl cellulose from *Populus*. *Iranian Journal of Wood and Paper Science Research*, 34 (2): 290-301 (In Persian).

Porbar, S., Hosseinzadeh, O. and Hajjarian, M., 2017. Prioritize of poplar wood processing industries in the Kurdistan province with the aim of poplar wood value chain upgrading. *Iranian Journal of Wood and Paper Science Research*, 32 (2): 181-192 (In Persian).

Rad, H., Jazireie, M.H. and Soltani, M., 2016. The relationship between root development and drought resistance of two *Eucalyptus* species (*Eucalyptus microtheca* Muell and *Eucalyptus sargentii* Maiden). *Iranian Journal of Forest*, 8 (3): 393-404 (In Persian).

- Rad, M.H. and Soltani Gerdeframarzi, M., 2019. Root response of woody phreatophyte species to drought stress (Case study: *Eucalyptus camaldulensis* Dehnh). *Iran Nature*, 3 (6): 46-53 (In Persian).
- Rad, M.H. and Soltanii Gerdeframarzi, M., 2018. Effects of coppicing on vegetative growth and yield of coppice in three *Eucalyptus* species, damaged by frost (Case study: Wastewater treatment station of Yazd city). *Forest Research and Development*, 4 (2): 179-189 (In Persian).
- Rad, M.H., Assareh, M.H. and Soltani, M., 2017. Water requirement and water use efficiency in *Eucalyptus flocktoniae* (Maiden) Maiden and *E. leucoxylon* F. Muell. *Iranian Journal of Forest and Poplar Research*, 25 (3): 539-365 (In Persian).
- Rad, M.H., Sardabi, H., Soltani, M. and Ghelmani, S.V., 2019. Successful *Eucalyptus* species for afforestation and development of green spaces under irrigation with sewage. *Iran Nature*, 4 (3): 51-59 (In Persian).
- Resalati, H. and Nikkhah Dafchahi, M., 2017. Potential of CMP pulp production of *Salix* species in comparison with *Populus*. *Iranian Journal of Wood and Paper Science Research*, 32 (4): 585-595 (In Persian).
- Resalati, H. and Nikkhah Dafchahi, M., 2018. Improvement of the properties of Poplar chemi-mechanical newsprint through controlling process parameters. *Iranian Journal of Wood and Paper Science Research*, 33 (2): 290-299 (In Persian).
- Rezvani, M.H., Talaei, A. and Rajabi Cham Heidari, H., 2017. Modification of *Paulownia* wood with methylolated dimethyloldihydroxyethylenurea (mDMDHEU) and the investigation of its effect on some of strength properties. *Iranian Journal of Wood and Paper Science Research*, 32 (3): 436-449 (In Persian).
- Rostampour Haftkhani, A., Layeghi, M., Ebrahimi Gh. and Pourtahmasi, K., 2017. Evaluation of bending performance of cross laminated timber (CLT) made out of poplar (*Populus alba*). *Iranian Journal of Wood and Paper Industries*, 8 (1): 67- 78 (In Persian).
- Sadati, S.E. and Tabari Kouchaksaraei, M., 2018. Response of survival, growth and some morpho-physiological and biochemical characteristics of *Populus caspica* Bornm. seedling to salinity. *Journal of Forest and Wood Products*, 70 (2): 95-104 (In Persian).
- Sadati, S.E., Mokhtari, J. and Asadi, F. 2019. Study of drought tolerant of one- yaer- old seedlings 5 clones of *Populus deltoides* Bartr. ex Marsh. *Iranian J. of Forest and Poplar Research*. 27 (4): 365-376 (In Persian).
- Sadeghi, S.M., Sardabi, H., Kazerooni, H., Sharifi, M.A., Farrar, N. and Rashvand, S., 2018. Investigation on adaptability and performance of industrial *Eucalyptus* species in Dashtestan, Bushehr province. *Iranian Journal of Forest and Poplar Research*, 26 (2): 264-275 (In Persian).
- Saghafi, F., Taheri Abkenar, K. and Ghorbznadeh, N., 2019. The effect of different poplar clones on soil biological characteristics in north of Iran. *Journal of Forest and Wood Products*, 72 (3): 227-235 (In Persian).

- Salehi, A., Calagari, M. and Ahmadloo, F., 2018. Effect of some soil properties on growth of three-year black poplar (*Populus nigra* L.) trees in poplar plantations in south of Tehran. *Iranian Journal of Forest and Poplar Research*, 26 (3): 344-354 (In Persian).
- Salehi, A., Tabari, M., Mohammadi Goltapeh, E. and Shirvani, A., 2016. Lead tolerance of *Populus nigra* in symbiosis with Arbuscular mycorrhizal fungi in relation to physiological parameters. *Journal of Natural Environment*, 69 (1): 79-93 (In Persian).
- Samariha, A. and Khademi Eslam, H., 2017. The effect of water vapor treatment of wood flour on physical and mechanical properties of hybrid composite made of poplar fiber and recycled polypropylene. *Iranian Journal of Wood and Paper Science Research*, 32 (3): 411-421 (In Persian).
- Shamsian, M. and Mansouri, H., 2016. Mechanical properties of a light weight wood base sandwich panel made from sunflower stalks and poplar layer scrap. *Journal of Forest and Wood Products*, 69 (1): 199-214 (In Persian).
- Sharafieh, H., Bahadori, F. and Ghorbanian, D., 2018. Adaptability test of different species of *Eucalyptus* with the aim of increasing productivity and generating secondary income for farmers. *Iran Nature*, 3 (5): 40-47 (In Persian).
- Shariat, A. and Assareh, M.H., 2016. Physiological and biochemical responses of eight *Eucalyptus* species to salinity stress. *Ecopersia*, 4 (1): 1269-1282.
- Shariat, A., Assareh, M.H. and Ghamari Zare, A., 2017. Osmoprotectants and physiological responses of three *Eucalyptus* species to toxic concentrations of lead. *Iranian Journal of Forest and Poplar Research*, 25 (1): 137-148 (In Persian).
- Sheykh, H., Ali-Arab, A.R., Sadati, S.E., 2018. Effect of salinity on seed germination, growth and survival of *Paulownia fortunei* seedlings under laboratory and greenhouse conditions. *Journal of Forest and Wood Products*, 70 (4): 649-658 (In Persian).
- Siadaty far, M., Lahooti, M. and Cheniany, M., 2017. Allelopathic effect of *Eucalyptus* extract on antioxidative responses of soybean and velvetleaf. *Journal of Plant Research (Iranian Journal of Biology)*, 30 (1): 110-118 (In Persian).
- Sobhani Oskouie, F., Ghorbani, M. and Amini Nasab, S.M., 2016. The effect of modification with Silan compound on physical properties of *Populus*. *Iranian Journal of Wood and Paper Science Research*, 31 (3): 458-471 (In Persian).
- Solgi, S., Salehi, A., Alavi, S.J., Pourbabaei, H. and Shabanpour, M., 2016. Evaluation of poplar (*Populus deltoids* Marsh.) stands height growth using a generalized additive model (case study: Guisoum & Haft-daghanan Region, Guilan Province). *Iranian Journal of Forest and Poplar Research*, 24 (2): 366-378 (In Persian).
- Talaei, A. and Rezvani, M.H., 2017. Influence of chemical modification with polyurethane ECR on the functional performance of poplar wood polymer. *Iranian Journal of Wood and Paper Science Research*, 32 (1): 33-46 (In Persian).
- Tamjidi, A., Faezipour, M.M., Doosthoseini, K., Ebrahimi, Gh. and Khademieslam, H., 2017. Investigation on the properties of oriented strand boards (OSB) made from mixture ten-year-

old poplar clones. *Iranian Journal of Wood and Paper Science Research*, 31 (4): 648-661 (In Persian).

Tavakoli Neko, H., Shirvani, A., Assareh, M.H. and Morshedloo, M.R., 2019. Physiological response to salinity stress in various *Populus euphratica* Oliv. ecotypes in Iran. *Ecopersia*, 7 (2): 97-103.

Tavakoli Niya, A., Assareh, M.H., Shariat, A. and Bakhshi-Khaniki, Gh., 2016. Effects of salinity stress on morphological and physiological parameters in three *Eucalyptus* species. *Iranian Journal of Rangelands and Forests Plant Breeding and Genetic Research*, 24 (1): 42-53 (In Persian).

Tavousi Rad, F., Ghamari Zare, A., Mirzaie-Nodoushan, H. and Usefifard, M., 2017. Evaluation of poplar inter-specific progenies based on their morphologic and micro-morphologic traits. *Iranian Journal of Forest and Poplar Research*, 24 (4): 686-675 (In Persian).

Toghraie, N., 2016. Position and role of tension wood in trees - case study: *Eucalypts*. *Iranian Journal of Wood and Paper Science Research*, 31 (2): 237-247 (In Persian).

Vahedi, A.A., 2016. Providing optimal protocol for sale of one-year-old poplar saplings (*Populus deltoides*) through modeling allometric equations. *Forest Research and Development*, 1 (3): 195-208 (In Persian).

Vahedi, A.A., Bijani, A. and Khatib-Nia, E., 2016. Spatial analysis and long-term dynamics for above-ground biomass of Caspian poplar (*Populus caspica* Bornm.) in developmental stages of natural stands in Nour Forest Park. *Forest Research and Development*, 2 (3): 257-271 (In Persian).

Yousefi, B. and Modir Rahmati, A.R., 2018. Evaluation of growth and yield of black poplar (*Populus nigra* L.) clones under drought stress period in comparative populetum of Sanandaj. *Iranian Journal of Forest and Poplar Research*, 26 (2): 276-290 (In Persian).

Yousefi, B., 2019. Adaptation and growth of musk willow (*Salix aegyptiaca* L.) populations in the Sanandaj collection, Iran, *Iranian Journal of Forest and Poplar Research*, 27 (3): 300-310 (In Persian).

Yousofvand Mofrad, M., Soosani, J., Akhavan, R., Abrary, K., Sepahvand, I. and Jahanpour, F., 2018. Estimating above-ground woody biomass of planted Poplar using Allometric models. *Wood and Forest Science and Technology*, 25 (2): 97-108 (In Persian).

3. Relations with other countries

As mentioned, about 70% of poplar plantations was included *P. nigra* and *P. alba* which planted in arid and semi-arid regions with the climate of moderate to cold. therefore, the clones which can tolerate these climates are in priority for planting.

P. deltoides and *P. euramericana* that were imported via Research Institute of Forests and Rangelands (RIFR) from Europe in 1965 are not tolerant and acclimation to the hot climate and drought stress, so they were expanded in the north region with enough rainfall and

humidity. The preference of improvement project of the department of Poplar and fast-growing tree species, Research Institute of Forests and Rangelands (RIFR), has been producing of hybrids with ability to plant in warm and dry climates and tolerant to saline soil. At present, the hybrid clone of Mofid (*P. euphratica* x *P. alba*) and the clones of *P. nigra* that were imported from Turkey are in better condition.

4. SUMMARY STATISTICS (Questionnaire)

Country	Iran
Contact person	Mohsen Calagari
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Question 1: Total area 2019, and area planted from 2016 to 2019 (area change over the last 4 years)

Land Use Category	Total Area 2019 (ha)	Total area by forest function in %				Area planted from 2016-2019 (ha)
		Production		Protection (%)	Other (%)	
		Industrial roundwood (%)	Fuelwood biomass (%)			
Naturally Regeneration Forest						
Poplar	30000	0	5	90	5	0
Willows	13000	0	10	70	20	0
Mix of P&W	0	0	0	0	0	0
Alder	25716					
Total						
Planted forest						
Poplars	30300	100	0	0	0	8094
Willows	0	0	0	0	0	0
Mix of P&W	0	0	0	0	0	0
Alder	153966					13856
Eucalypt	5132	100	0	0	0	2824
Total						
Other Land with Tree Cover	Data not available					
Agroforestry						
Poplars	2200	100	0	0	0	650
Willows	0	0	0	0	0	0
Total						
Trees in urban setting						

	Poplars	1500					Data not available
	Willows	Data not available					
	Eucalypt	400					
	Grand Total	262214					25424

Question 2: Wood removals in 2019

Forest category and species, cultivar or clone		Wood removals 2019 in m ³				
		Total removals	for industrial roundwood			for fuelwood, wood chips
			Veneer/plywood	Pulpwood	Sawnwood	
Naturally Regeneration Forest						
	Poplar	0	0	0	0	
	Willows	Data not available				
	Mix of P&W	0	0	0	0	
	Alder	0	0	0	0	
	Total					
Planted forest						
	Poplars	2200000	Data not available			
	Willows	400000	Data not available			
	Mix of P&W	0				
	Alder	0				
	Eucalypt	128300	Data not available			
	Total					
Other Land with Tree Cover						
Agroforestry						
	Poplars	55000	Data not available			
	Willows	0				
	Mix of P&W					
	Total					
	Grand Total	2783300				

Question 3: Forest products from poplars and willows 2019

There are no data on wood products based on the type of species, but there are data on the total amount of wood raw materials used in each wood product.

Forest category	Fuelwood	Chips	Industrial roundwood (logs, pulpwood)	Wood-pulp (mech. or chem.)	Particleboard fibreboard (MDF, hardboard)	Veneer sheets	Plywood	Sawnwood	
'000 m ³ (r)									
Naturally Regeneration Forest									
	Poplar	0	0	0	0	0	0	0	
	Willows	0	0	0	0	0	0	0	
	Mix of P&W	0	0	0	0	0	0	0	
	Alder	0	0	0	0	0	0	0	
	Total								
Planted forest									
	Poplars								
	Willows								
	Mix of P&W								
	Alder								
	Eucalypt								
	Total	0	0	208	900	825	0	0	450
Agroforestry									
	Poplars								
	Willows								
	Mix of P&W								
	Total								
	Grand Total	0	0	208	900	825	0	0	450

Question 4: Please reflect on the prevailing trends until 2030 in the development of poplars and willows in your country!

What is your opinion on the following issues?

Please put a cross in the column you think most appropriate

	increase	decrease	remain as it is	no comment
1a. The conversion of naturally regenerating forests of poplar to other land uses will...		+		
1b. The conversion of naturally regenerating forests of willow to other land uses will...	+			
1c. The conversion of naturally regenerating forests of other fast-growing species to other land uses will...		+		
2a. The conversion of planted forests of poplar to		+		

other land uses will...				
2b. The conversion of planted forests of willow to other land uses will...				+
2c. The conversion of planted forests of other fast-growing species to other land uses will...		+		
3a. The area of poplars for bioenergy plantations will		+		
3b. The area of willows for bioenergy plantations will		+		
3c. The area of other fast-growing trees for bioenergy plantations will		+		
4a. Government investments in poplars will ..	+			
4b. Government investments in willows will ...				+
4c. Government investments in other fast-growing trees will ...	+			
5a. Private sector investments in poplars will ...	+			
5b. Private sector investments in willows will ...				+
5c. Private sector investments in other fast growing trees will ...	+			
6a. The significance of poplars for productive purposes will ...	+			
6b. The significance of willows for productive purposes will ...				+
6c. The significance of other fast-growing species for productive purposes will ...	+			
7a. The significance of poplars for environmental protection purposes will ...	+			
7b. The significance of willows for environmental protection purposes will ...	+			
7c. The significance of other fast-growing species for environmental protection purposes will ...	+			
8a. The rejection by environmental groups of poplars will...		+		
8b. The rejection by environmental groups of willows will...		+		
8c. The rejection by environmental groups of other fast-growing trees will...		+		
9a. The acceptance by the general public of poplars as important natural resources will.....	+			
9b. The acceptance by the general public of willows as important natural resources will.....	+			
9c. The acceptance by the general public of other fast-growing trees as important natural resources will.....	+			

---END OF QUESTIONNAIRE---