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ORIGINAL ARTICLE

Indicative plants with nitrogen indicator in the flora of the Nakhchivan Autonomous Republic

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One of the important factors in the life of plants is the element nitrogen, a macronutrient. Nitrogen plays an important role in the early development of the vegetative organs and fruits of plants. Nitrogen plays an irreplaceable role in the synthesis of enzymes involved in plant metabolism. It also plays an important role in the growth and development of plants. The excess and deficiency of nitrogen, an important nutrient, significantly affect plants. Determining the amount of nitrogen in plants by indicative plants is the main object of modern agrochemical research. The amount of nitrogen is studied through chemical analysis of soils. However, the development of these methods requires a lot of additional costs, chemical reagents, and manpower. The determination of nitrogen deficiency or excess amount using indicator plants is one of the main objectives of modern researchers. As an indicator of nitrogen, wild and cultivated plants are used.

Keywords: Nitrogen, Indicators plants, Soil, Leaf, Sign, Vegetation.

Introduction

Symptoms appear in leaves when plants lack nitrogen. In this case, the leaves of the plant are pale, yellowish green, and their trunk is straight (*Zea mays* L.). Lack of nitrogen causes plant growth to fade, crops become less quality, and seeds are weak (*Triticum* L.). Leaves are small and faded, chlorophyll synthesis decreases, and plant diseases are more susceptible.

When low and high temperatures are observed on dry land, the effects of heavy rain cause basicity by nitrogen deficiency, which disrupts the fertilization process in plants. In field conditions, pale green color or yellow spots spread rapidly and the leaves are completely wrapped. Its indicator characteristic is determined by using the amount of nitrogen in the leaves to diagnose nutrition (Snowball, Robson, 1991; Sawyer, 2004; Ruiz Diaz et al., 2011; de Oliveira Ferreira et al. 2015).

The amount of nitrogen spread in all plants is determined by changes in leaf colors: from light green to yellow, and old leaves become yellow or orange. When nitrogen deficiency increases, the plant dries. *Zea mays* L., *Secale* L., *Cicer* L., *Phaseolus* L., *Solanum tuberosum* L., *Brassica* L., fruit trees are indicator plants that are a key indicator of nitrogen deficiency.

Normal nitrogen nutrition of woody plants significantly affects their development and the shape of vegetative organs (Millard and Proe, 1991; Cabrera, 2003; Fustec and Beaujard, 2000). Among other things, it has a beneficial effect on the resistance of the disease and susceptibility to harmful insects (Daane et al., 1995; Pellet and Karter, 1981) and creates normal conditions for the transfer of nutrients (Macfarlane et al., 2005).

The indicator status of nitrogen is more rapidly detected in the early stages of plant growth in parnics (Demotes-Mainard et al., 2008). Some symptoms are observed in the development of leaves during N, P, K, Ca, Mg, B, and Fe deficiency (Yeh et al., 2000).

When pH was 4.2-4.4 in the soil, there was a sufficient decline in wheat productivity compared to pH 5.1 (Schroder et al., 2011a; 2011b; Miroshnichenko et al., 2015).

During the second period of the vegetation of *Beta vulgaris* L. vegetation, the amount of precautionary nitrogen decreases (Minakov et al., 2011, 2016, Zavalin et al., 2018). in *Beta vulgaris* L. when the demand for nitrogen is met, the case occurs by the normality of the color of the leaves, the development of root eggs, and the rise in productivity from the hectare. The amount of nitrogen is generally determined by the results of a soil analysis of each zone (Franzen et al., 2011).

The use of nitrogen in the cultivation of natural and agricultural plants has been identified by 24 principles by the Economic Commission of the United Nations Economic Commission for Europe. Nitrogen is vital to life on Earth. However, too much of it has been dangerous, and water holds poison plants, animals, and humans. This is because parnic gases containing nitrogen oxides pollute a large amount of gases. Economic and Social Council, United Nations ECE/EB.AIR/2020/6ECE/EB.AIR/WG.5/2020/).

When nitrogen is deficient, plant growth weakens, serious energy exchange disorders occur, photosynthesis intensity decreases, plant tissue decreases water storage properties(Pryanishnikov, 1965; Nikitishen, 2003; Nikitishen, 2012, Pushchino, 2015.).

Nitrogen is an important macroelement that affects the growth of the plant. It contains amino acids, nucleic acids, and a second metabolite. Nitrates are the main source of nitrogen in the soil.

Materials and Methods

As a research object: From plants grown and planted wild on nitrogen-rich lands: *Alopecurus myosuroides* Huds. *Echinochloa crusgalli* (L.) Beauv., *Caltha palustris* L., *Galium aparine* L., *Chenepodium album* L., *Atriplex patula* L., *Cirsium arvense* (L.) Scop., *Taraxacum officinale* Wigg., *Artemisia vulgaris* L., *Cichorium intybus* L., *Veronica persica* Poir., *Veronica hederifolia* L., *Capsella bursa-pastoris* (L.) Medik., *Lamium amplexicaule* L., *Lamium album* L., *Leonurus quinquelobatus* Gilib., *Euphorbia helioscopia* L., *Stellaria media* (L.)Vill., *Rumex obtusifolius* L., *Fallopia convolvulus* (L.)A.Love, *Polygonum monspeliense* Thieb. Ex Pers., *Solanum nigrum* L., *Solanum dulcamara* L., *Anthriscus sylvestris* (L.) Hoffm., *Urtica urens* L., *Potentilla anserina* L., *Papaver dubium* L., Less nitrogen**-** *Anthoxanthum odoratum* L., *Daucus carota* L., *Medicago lupulina* L., *Elaeagnus angustifolia* L., *Hippophae rhamnoides* L.**,** Growing up in lands with a lot of nitrogen**-** *Atriplex tatarica* L., *Urtica dioica* L., *Chamaenerion angustifolium* (L.) Scop., *Amaranthus retroflexus* L. Observations have been made on wild species. From cultural plants along with wild plants: *Solanum tuberosum* L., *Beta* L., *Zea* L., *Lycopersicon* Hill., *Lactuca sativa* L. Similarly to performing the nitrogen fixation process of atmospheric nitrogen: *Phaseolus* L., *Cicer* L., *Glycine* Willd., *Lens* Mill. observations have been made on plants, such as demonstrated. Observations have been made on soils that spreading in the Autonomous Republic of Nakhchivan such as gray (up to 0.1%), gray alluvial (up to 0.06 percent of total nitrogen), irrigated grass (up to 0.6%), brown soil (up to 0.4 percent of total nitrogen) (Aliev, Zeynalov, 1988; Mamedov, 2002; Gasimov, 2010; Parakhnevich, Kirik, 2016). To determine the amount of nitrogen in the soil, soil samples of soil have been collected from various depths of vegetation that grow and grow wild plants: 0-15 cm, 25-30 cm (Gadzhiev S.A., 2010). Sample collection has been conducted in a variety of ways, such as vegetation. In the samples, the total amount of nitrates and ammonium nitrogen was performed with the help of the "Expert-003" and the "Spectrophotometer UV-2900"(Morosanova, 2018). The nitrogen fertilizer is given in the form of NH_4NO_3, where the amount of nitrogen is determined. Mineral fertilizers applied in the N90P90K60 ratio (Alakbarov, 2016). In desert experiments, N-Tester device was used to measure the amount of nitrogen in the leaves of wild plants. The amount of nitrogen has also been taken into account when determining the lack of food in plants in desert conditions (Ruiz Diaz et al., 2011).

Results

To study the indicator of nitrogen, observations have been made on wild plants grown in gray, alluvial and brown soils in the lower and middle mountains of the autonomous Republic of Nakhchivan. From plants characterized by nitrogen-rich soils: *Artemisia vulgaris* L, *Cirsium arvense* (L.) Scop., *Taraxacum officinale* Wigg., *Chenepodium album* L., *Atriplex patula* L., *Galium aparine* L., *Alopecurus myosuroides* Huds**.**, *Echinochloa crusgalli* (L.) Beauv., *Caltha palustris* L., *Galium aparine* L**.**, *Cichorium intybus* L**.**, *Veronica persica* Poir**.**, *Veronica hederifolia* L**.**, *Capsella bursa-pastoris* (L.) Medik**.**, *Lamium amplexicaule* L., *Lamium album* L**.**, *Leonurus quinquelobatus* Gilib**.**, *Euphorbia helioscopia* L**.**, *Stellaria media* (L.) Vil., *Rumex obtusifolius* L**.**, *Fallopia convolvulus* (L.) A. Love**,** *Polygonum monspeliense* Thieb. Ex Pers**.**, *Anthriscus sylvestris* (L.) Hoffm**.**, *Urtica dioica* L**.**, *Urtica urens* L**.**, *Potentilla anserina* L**.**, *Papaver dubium* L. Studies on species have confirmed nitrogen deficiency in soil through the Expert-003, The Spectophotometer UV-2900 pribor, and the results of testing the leaves of plants with the N-Tester device. However, there were signs of nitrogen deficiency in the leaves of plants grown in the wrong areas. Minerals in such lands are a source of loss when they are washed. Our research found that species planted such as *Solanum nigrum* L., *Solanum dulcamara* L., *Lactuca sativa* L. are also indicators of nitrogen-rich land.

In species such as *Anthochanthum odoratum* L., *Daucus carota* L., *Medicago lupulina* L., *Elaeagnus angustifolia* L., *Hippophae rhamnoides* L., signs of paleness in the leaves, weakness in plant development, and low quality of crops were observed. The lack of nitrogen nitrate and ammonium in the soil was confirmed by soil analysis.

Characteristics such as rapid growth, dark green in leaves and vegetation were discovered in *Atriplex tatarica* L., *Urtica dioica* L., *Chamaenerion angustifolium* (L.) Scop., *Amaranthus retroflexus* L. These plants are indicators of an excess of nitrogen in the soil. Observations in plants grown in nitrogen-rich or low soil confirm the opinions of researchers.

When there is not enough nitrogen in the soil, the synthesis of proteins in plants stops, the growth process in plants slows, the leaves are open green, and the young leaves cannot reach their normal size. The lack of nitrogen is as evident in the trunk as it affects different organs of plants. Thus, in plants, the branches are sharply angled. The lack of nitrogen in the soil affects different plant groups differently; for example, the *Vitis* L. plant reports a lack of nitrogen: chlorosis, leaves are small-scale, yellowish-green, leaf stems and main veins are reddish-brown. Fruit trees also show a lack of nitrogen: Fruits are smaller and dryer than normal, pouring quickly, low productivity, and quickly ruined because they are unstable for transportation and storage. In fruit plants, the leaves gradually wrap, forming red and brown necrotic stains on them, and weakening the buds. The fruit has a small size, bright color, and a bright taste. The leaves are also small and are quickly wrapped around them. Their branches are fragile and their fruits are small in size.

Lycopersicon esculentum Mill, a vegetable plant. The leaves at the bottom and middle of the stem are first green, then yellow-green, and in the final stages they are fully wrapped. The lack of nitrogen varies depending on the degree to which plants are affected. Therefore, when nitrogen deficiency is partially present in the soil, it does not affect the size of leaves and fruits, but there are noticeable growth are noticeable. If there is a significant lack of nitrogen in the soil, abnormalities will be observed in the size and color of the leaves.

Sometimes microelements also affect the abnormal nitrogen consumption of plants. The deficiency of iron (Fe) and molybdenum (Mo) is due to the excessive accumulation of nitrogen in plants (especially in fruit trees). If there is a lack of water in the nitrogen feed, there is a decrease in the size and growth of fruit trees, but a stop in growth (Aghayev J., 2016).

In contrast, during excess nitrogen, plants grow rapidly (especially when phosphorus and calcium are lacking), and the color of the leaves turns dark green. Seeds are tender and spectacular, and their duration of disease and low temperatures increases. The excess of nitrogen also has a negative impact on the quality of the product. (Alakbarov, F., 2016.) When the nitrogen element is already present, it affects the vegetation period in plants and extends its duration. The fact that the leaves of plants are bright green is an indication of the abundance of nitrogen. Plants are absorbed into nitrogen-like nitrates, nitrides and ammonia by a special group of bacteria. At that time, 20% of plants' demand for nitrogen is met. The rest are absorbed from the soil and fertilizers.

Plants are natural indicators of whether the soil is rich in nitrogen. Plants that have more nitrogen in the soil are divided into two categories: nitrophilic (growing in nitrogen-rich soil) and nitrophobia (plants grown in lands that do not have enough nitrogen). Nitrophobic plants, an indicator of the nitrogen minority in the soil (usually plants), have adapted to live in such lands because they live in conjunction with microorganisms capable of absorbing nitrogen in the atmosphere. Such microorganisms can enrich an acre [200 to 300 kg] of nitrogen. However, in addition to plants, there are plants that live in nitrogen-thinking microorganisms (*Elaeagnus angustifolia* L*., Hippophae rhamnoides* L).

Indicator plants with nitrogen indicators have a unique place in the Armenian flora, as they are found in other flora. Therefore, there are plants in the Armenian flora that are an indicator of various species. The following chart lists the indicator plants that are nitrogen in our flora indexation object (Table 1):

Table 1. Indicative plants with nitrogen indicator in the flora of the Nakhchivan Autonomous Republic.

Growing up in nitrogen-rich land		**Growing in lands where nitrogen is scarced**	
Familia: *Poaceae* Banhart.	*Alopecurus myosuroides* Huds.	**Familia:** *Poaceae* Banhart.	*Anthoxanthum odoratum* L.
	Echinochloa crusgalli (L.) Beauv.	**Familia:** *Apiaceae* Lindl.	*Daucus carota* L.
Familia: *Ranunculaceae* Juss.	*Caltha palustris* L.	**Familia**: *Fabaceae* Lindl.	*Medicago lupulina* L.
Familia: *Rubiaceae* Juss.	*Galium aparine* L.	**Familia**: *Elaegnaceae* Juss.	*Elaeagnus angustifolia* L.
Familia: *Chenopodiaceae* Vent.	*Chenepodium album* L.		*Hippophae rhamnoides* L.
	Atriplex patula L.		
Familia*:* *Asteraceae* Dumort.	*Cirsium arvense* (L.) Scop.		
	Taraxacum officinale Wigg.		
	Artemisia vulgaris L.		
	Cichorium intybus L.		
	Lactuca sativa L.		
Familia: *Scrophulariaceae* Juss.	*Veronica persica* Poir.		
	Veronica hederifolia L.		
Familia: *Brassicaceae* Burnett.	*Capsella bursa-pastoris* (L.) Medik.		
Familia: *Lamiaceae* Lindl.	*Lamium amplexicaule* L.		
	Lamium album L.		

	Leonurus quinquelobatus Gilib.
Familia: *Euphorbiaceae* Juss.	*Euphorbia helioscopia* L.
Familia: *Caryophllaceae* Juss.	*Stellaria media* (L.)Vill.
Familia: *Polygonaceae* Juss.	*Rumex obtusifolius* L.
	Fallopia convolvulus (L.)A.Love
	Polygonum monspeliense Thieb. Ex. Pers.
Familia: *Solanaceae* Juss.	*Solanum nigrum* L.
	Solanum dulcamara L.
Familia: *Apiaceae* Lindl.	*Anthriscus sylvestris* (L.) Hoffm.
Familia: *Urticaceae* Juss.	*Urtica dioica* L.
	Urtica urens L.
Familia: *Rosaceae* Juss.	*Potentilla anserina* L.
Familia: *Papaveraceae* Juss.	*Papaver dubium* L.

The chart shows that 29 species of nitrogen-rich lands in 16 chapters are found in nitrogen-rich lands in the autonomous Republic of Nakhchivan, 5 species of nitrogen elements in 4 chapters, and 4 species of nitrogen in Chapter 4. Among the plants that are an indicator of nitrogen-rich land in the Nakhchivan flora, *Asteraceae Dumort., Lamiaceae Lindl. (Subfamilia: Lamioideae) and Polygonaceae Juss. Species* that belong to their chapters are dominated. Three species of indicators plants with nitrogen indicator in the flora of the Nakhchivan Autonomous Republic are 1 seed leaf (*Alopecurus myosuroides* Huds., *Echinochloa crusgalli* (L.) Beauv. v *Anthoxanthum odoratum* L., all of them belong to *Poaceae* Banhart), the others are belong to 2 seeds leaves. The species in the chapter of *Poaceae* Banhart., *Chenopodiaceae* Vent., *Urticaceae* Juss. are not one but other groups. *The Urtica dioica* L. species, on the other hand, is found in lands that are both nitrogen and the highest amount of nitrogen.

Conclusion

In addition to these plants, another species of 1 seed leaf plants such as *Poaceae Banhart. Alopecurus myosuroides* Huds. is an indicator that nitrogen in the soil is moderate. *Violaceae* Batsch. The *Plantago lanceolata* L. species of *Viola tricolor* L. and *Plantaginaceae* Juss are considered an indicator of the absence of nitrogen when they grow in lands that are not nitrogen. There are also species included in the Red Book in the ranks of plants that indicate plants with nitrogen indicator in the flora of Nakhchivan. For example, *Viola tricolor* L Lower Risk-LR [c-Least Concern-LC, *Hippophae rhamnoides* L. Near Thereatened-NT included in the Red Book of the Autonomous Republic of Nakhchivan.

It is more convenient and easy to study the chemical composition of the soil with such indicator plants. That is, without any difficult method, you can simply identify the chemical composition of the soil through such plants.

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