

## Immune strengthener plants in Azerbaijan flora

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The main goal of the work was to study immunomodulating and strengthening plants in the flora of Azerbaijan. The frequency of use (Ui) and the value of plant species relative to each other due to their immunomodulatory properties have been evaluated by new methods. The total amount of data submitted by the person providing for each specific species is marked as Ni. The result of the ratio of immunomodulators have been shown in the diagram: the highest IQ (assessment of use) was found for *Allium* sp. and *Thymus* sp. (0.90-0.88), the next places are occupied by *Rosa* sp. (0.83), *Salvia limbata* (0.81), *Althea officinalis* (0.80), *Glycyrrhiza glabra* (0.78), *Mathricaria* sp. (0.77), *Humulus lupulus* (0.74), *Mentha* sp. (0.60), *Sitrus* ssp. (0.27), *Capsella burssa pastoris* (0.21), *Rumex* sp. (0.18), *Sambucus nigra* and *Helichrysum plicatum* (each by 0.15), *Daucus carota*, *Urtica dioica* and *Asparagus officinalis* (each by 0.10, the lowest IQ).

**Keywords:** Ethnobotany, anti-viral plants, immune-reducing agents

### INTRODUCTION

The benefits of plants for physical and mental health have long been known to mankind. Influenza viruses and other similar viruses have been plaguing to mankind for centuries (bu ümumi bəşəriyyətə məlum olan cümlədi bir yerdən götürmədim). Those who have a weak immune system suffer more, and those who are strong survive. Herbs have been used as a natural remedy for various diseases, including infections for centuries. Herbal treatment is more important than chemical drugs in the fight against diseases in modern alternative medicine (Munir et al., 2018).

Immunological protection is conventionally classified into 2 categories: congenital and acquired (Beck et al., 1996). Congenital or non-specific (natural, non-adaptive) immune system is the initial stage of the body's protection against biological aggression. Components of the innate immune system are readily available in humans and animals at moments of birth, and their fight against the antigen occurs quickly, without the need for any

preparation. An adaptive or acquired immune system (specific) is the next stage of defense. The acquired immune system is formed by lymphocytes during the individual development of the body's ontogeny (Parkin et al., 2001). These systems differs from the innate immune system by high specificity and memory. Specific immunological response is created against each antigen that enters the body in this case. The encounter with the antigen is stored in the memory of the immune system, and stronger defense is formed against under second encounter with the antigen. Cells are able to distinguish a group of foreign molecules in the innate immune system in contrast, not every antigen molecule.

Immune preparations are aimed at producing of high levels interferon based on human blood analyses. The interferon protein both prevents the multiplication of viruses and acts as an immunostimulant (De Andrea et al., 2002). So clearly shows the consequences of improper use of immune drugs and stimulants. On the other hand, no matter how mild the natural remedies, keep in

mind that these are also medicines. There is a greater need for immune treatment (both herbal and chemical) in the autumn and winter months. Onion (*Allium* sp.) and thyme (*Thymus* sp.) are the most widely used antiviral plants among local communities (Ibadullayeva et al., 2015), these plants are collected and used by local communities as antiviral agents.

We self must to help our immune systems by stimulants, for example.

The most popular herbal immunomodulators are ginseng, eleutherococcus, echinacea, aloe, kalanchoe, tarragon and baby mushrooms. However, plants distributed in the flora of Azerbaijan have also been introduced into production as immuno-modulators (Kakhramanova et al., 2017)

The main goal of research is not only to study ethnopharmacological activity, but also to determine the biologically active plants for their further use (Martin, 1995).

## MATERIAL AND METHODS

*Collection and identification of plants.* Medicinal plants were collected from the study area with the help of herbalists and deposited to the Herbarium at the Institute of Botany (BAK). These plants were pressed and poisoned with 1% HgCl<sub>2</sub> solution, mounted at herbarium sheet and identified (Ibadullayeva, 2020; Askerov, 2016; Flora of Azerbaijan, 1950-1961).

Ethnomedicinal study was conducted in the period of March-June (2010-2020) and August-December (2010-2019). A preliminary visit of district administration that has authority to register the local herbalists to get the information about the local herbalists as key informants was conducted. The rural community dependent upon the traditional use of indigenous plants for a number of diseases due to low income and far-flung health facilities.

*Data analysis.* Data collected through various field surveys was analyzed through statistical software SPSS version 9.00 (Nadeem et al., 2015). Multiresponse of families was calculated with plants habits, preparations and applications. The data was also represented using the percentages and proportions. Each plant species reported by indigenous informant was counted by or frequency of citation (FC).

The relative importance of plant species was evaluated by calculating its use value as described by Phillips and Gentry (1993). Use value was calculated according to the formula  $UV_i = \sum U_i / N_i$ , where number of use report(s) cited by each informer for specific plant species *i* is represented by  $U_i$  and total number of informs interviewed for specific plant species *i* is represented by  $N_i$  (table 1).

Data was collected through rapid appraisal approach (RAA) by direct interact with local people and observations during the visits. Group meetings were conducted with people having adequate knowledge about indigenous plants and individual meeting were arranged with herbalists to counter-check the data. During the course of study 600 informants including 110 herbalists were interviewed from the district of Azerbaijan.

## RESULTS AND DISCUSSION

The following conclusions are drawn from the data collected on plant use. *Allium cepa* was the predominant plant which exhibited highest used value (0.90). It attributed the important recognition with local healers and efficient healing power against different ailments. Followed by *A. cepa*, *Thymus* sp. (0.88) exhibited higher UV while *Rosa* sp. reflected 0.83 UV followed by *Allium sativum* (0.82), *Salvia* sp. (0.81), *Althea officinalis* (0.80), *Glycyrrhiza glabra* (0.78), *Mathricaria* sp. (0.77), *Mentha* sp. (0.60), *Humulus lupulus* (0.74), *Daucus carota*, *Urtica dioica* and *Asparagus officinalis* (0.10) showed lowest UV and upshiftin UV was observed as *Sambucus nigra* (0.15), *Helichrysum plicatum* (0.15), *Rumex* sp. (0.18), *Capsella burssa pastoris* (0.21) and *Citrus* sp. (0.27). It is observed that the plant with high uses value were found frequently in the study area and the plant with low used value were some what fewer in availability in the study area. The diagram below shows the types identified (Fig. 1).

Some plants are widely used in the treatment of other diseases, including antivirals as have shown studies. Using antipyretic, anti-inflammatory, antiseptic, antitussive, antispasmodic and general strengthening herbs are necessary in diseases of the respiratory system.

**Table 1.** Data about number of diseases and plants used for their prevention represented by interviewed people

Local and Latin names of plant genera	Number of diseases	Local and Latin names of plant genera	Number of diseases	Local and Latin names of plant genera	Number of diseases
Sarımsaq – <i>Allium sativum</i>	48	Əvəlik – <i>Rumex confertus</i>	12	Kəndəlaş – <i>Sambucus nigra</i>	7
İtburnu – <i>Rosa canina</i>	21	Havuc – <i>Pastinaca umbrosa</i>	11	Qarğıdalı – <i>Zea mays</i>	7
Kəklükotu – <i>Thymus kotschyanus</i>	45	Mərəcəyüd – <i>Asparagus officinalis</i>	9	Solmazçiçək – <i>Helichrysum plicatum</i>	7
Adaçayı – <i>Salvia limbata</i>	19	Zeytun – <i>Olea europaea</i>	10	Atılbatıl – <i>Zosima orientalis</i>	6
Gulxətmi – <i>Althea officinalis</i>	18	Uşqun – <i>Rheum ribes</i>	9	İydə – <i>Elaeagnus angustifolia</i>	6
Cobanyastığı – <i>Mathricaria chamomilla</i>	16	Ardıç – <i>Juniperus communis</i>	9	Qudrət narı – <i>Momordica charantia</i>	5
Nanə – <i>Mentha piperita</i>	15	Mayaotu – <i>Humulus lupulus</i>	10	Zirə – <i>Carum carvi</i>	6
Amarant – <i>Amarantus viridis</i>	14	Dəfnə – <i>Laurus nobilis</i>	9	Bıyan – <i>Glycyrrhiza glabra</i>	6
Baldırqan – <i>Heracleum trachyloma</i>	9	Əməköməci – <i>Malva sylvestris</i>	9	Quşəppəyi – <i>Capsella bursa-pastoris</i>	7
Heyva – <i>Cydonia oblonga</i>	8	Gicitkan – <i>Urtica dioica</i>	13	Alca – <i>Prunus divaricata</i>	5
Soğan – <i>Allium sepa</i>	8	Çörəkotu – <i>Nigella sativa</i>	13	Yemişan – <i>Crataegus pentagyna</i>	6
Ceviz – <i>Juglans nigra</i>	7	Yer kökü – <i>Daucus carota</i>	13	Səhləb – <i>Dactylorhiza maculata</i>	4
Dağtərxunu – <i>Tanacetum vulgare</i>	8	Öküzboğan – <i>Bupleurum falcatum</i>	6	Qantəpər – <i>Cephalaria giganteae</i>	2
Üzərlik – <i>Peganium harmala</i>	5	İspanaq – <i>Spinacia oleracea</i>	1	Böyürtkən – <i>Rubus caesius</i>	4
Atşabalıdı – <i>Aesculus glabra</i>	3	Ərik – <i>Prunus armeniaca</i>	3	Lavanda – <i>Lavandula dentata</i>	6
Daziotu – <i>Hypericum perforatum</i>	9	Şüyüd – <i>Anethum graveolens</i>	13	CaytikanI – <i>Hippophae rhamnoides</i>	3
Çaşır – <i>Prongos acaulis</i>	3	Zirinc – <i>Berberis vulgaris</i>	4	Ayrıqotu – <i>Agropyron crstatum</i>	3
Əncir – <i>Ficus carica</i>	3	Badam – <i>Prunus dulcis</i>	3	Limon – <i>Citrus linon</i>	5
Bibər – <i>Capsicum annuum</i>	3	Qovaq – <i>Populus gracilis</i>	3	Küstüşam – <i>Bronya alba</i>	3
Cəfəri – <i>Petroselinum crispum</i>	3	Quşüzümü – <i>Solanum nigra</i>	3	Nar – <i>Punica granatum</i>	4
Kartof – <i>Solanum tuberosum</i>	3	Sumaq – <i>Rhus lancea</i>	3	At pıtrağı – <i>Arctium lappa</i>	2
Arpa – <i>Hordeum vulgare</i>	2	Çovdar – <i>Secale cereale</i>	2	Toppuztikan – <i>Echinops latifolius</i>	2
Buğda – <i>Triticum aestivum</i>	2	Çiriş out – <i>Eremurus speciosus</i>	3	Innab – <i>Ziziphus jujuba</i>	2
Cökə – <i>Tilia cordata</i>	2	Qara turp – <i>Raphanus sativus</i>	2	Qalxansız – <i>Athyrium filix-femina</i>	2
Qatırquyruğu – <i>Equisetum arvense</i>	2	Dəvətikanı – <i>Alhagi pseudalhagi</i>	1	Sığırquyruğu – <i>Verbascum denisiflorum</i>	6
Razyana – <i>Foeniculum vulgare</i>	2	Keçi buynuzu – <i>Ceratonia siliqua</i>	2	Qaracöhrə – <i>Taxus baccata</i>	2
Xiyar – <i>Cucumis sativus</i>	2	Qaytarma – <i>Potentilla erecta</i>	2	Xoruzgülü – <i>Primula officinalis</i>	2
Şahtərə – <i>Fumaria officinalis</i>	2	Xaşxaş – <i>Papaver hybridum</i>	1	Andız – <i>Inula helena</i>	8
Cincilim – <i>Stellaria media</i>	1	Dovşankələmi – <i>Crassula</i>	1	Dəliçətənə – <i>Datisca glabra</i>	1
Bədrənc – <i>Melisa officinalis</i>	1	Qovaq – <i>Populus</i>	1	Dağdağan – <i>Celtiscaucasica</i>	1
Gulabətin – <i>Pulsatilla</i>	1	Armut – <i>Pyrus</i>	1	Qarayonca – <i>Medicago officinalis</i>	1
Qumluca – <i>Arenaria serpyllifolia</i>	1	Ayıldöşəyi – <i>Dryopteris filix-mass</i>	2	Gəvən – <i>Astragalus dasyanthus</i>	1
Tərə – <i>Chenopodium album</i>	1	Murdarca – <i>Rhamnus pallasii</i>	1	Pomidor – <i>Tomate sativa</i>	1
Quşarmudu – <i>Sorbus latifolia</i>	1	Dagkişnişi – <i>Bifora radians</i>	1	Alma – <i>Malus coronaria</i>	1
Əzgil – <i>Mespilus germanica</i>	2	Üçrəng bənovşə – <i>Viola tricolor</i>	1	Subibəri – <i>Persicaria hidropiper</i>	1
Yabani kök – <i>Daucus carota</i>	1	Xardal – <i>Sinapis alba</i>	1	Bistort – <i>Bistorta major</i>	1
Yalançı cirə – <i>Pimpinella</i>	1	Qərənfil – <i>Dianthus orientalis</i>	1	Gilas – <i>Prunus avium</i>	1
Kişniş – <i>Coriandrum</i>	1	Pişikotu – <i>Valerianus officinalis</i>	1	Yulqun – <i>Tamarix ramosissima</i>	1
Tut – <i>Morus nigrum</i>	1	Yolotu – <i>Polygonum aviculare</i>	1	Söyud – <i>Salix nigra</i>	1
Küncüt – <i>Sesamum indicum</i>	1	Quzu qulağı – <i>Oxalis asetosella</i>	1	Portağal – <i>Citrus sinensis</i>	1

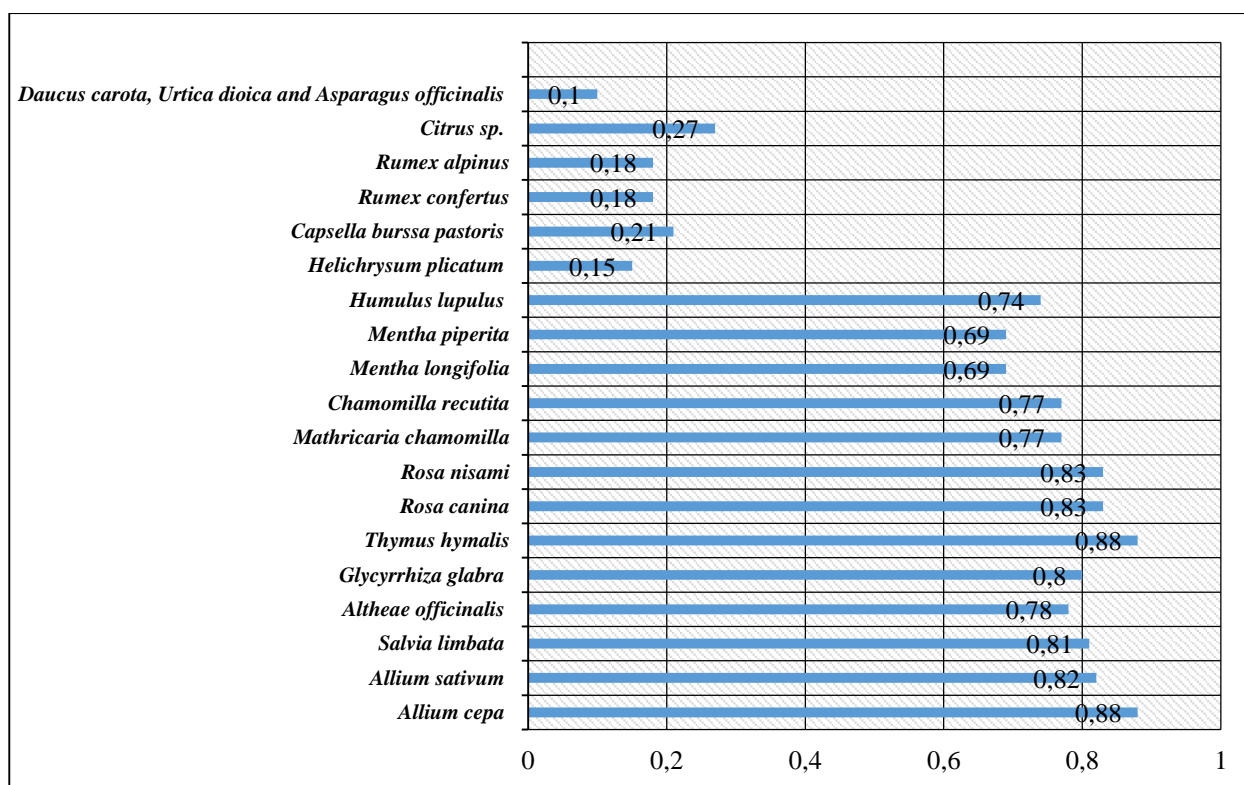


Fig. 1. Usevalue of frequently used plants.

In view of all this, the immunosuppressive properties of some plant mixes have been determined. For the first time, a phyto-collection has been prepared to be produced in the pharmaceutical industry.

Plants collected according data of field surveys and observations conducted by botanists, lojman, biology teachers, pharmacists and other local communities, generally local experts in remote areas of Azerbaijan for many years.

The data presented below are the results of research conducted in all surveyed districts (more than 50) for 2010-2020 years. The immuno-modulatory phyto-collection was tested in an outpatient setting: blood samples were taken from a 10-year-old sick child and a 42-year-old sick man with weak immune systems, and the phyto-herbal syrup prepared 3 times a day for 3 weeks was given to a sick child and phyto-tea to a sick man for 3 weeks. The analysis of blood taken from patients after treatment was in full compliance with the norm. Increased protective capacity of the body. Unique effect on the rapid recovery of complex colds, flu,

bronchitis, angina, pneumonia, bronchial asthma and infections have revealed. Following plant phytonutrients as a medicine is recommended as a restorative and protective of the immune system, especially for those who live in unfavorable climatic and environmental conditions. The phyto-collection contains the surface part of *Echinacea purpureae*, *Hypericum perforatum* herb, *Glycyrrhiza glabra* roots, *Rosa canina* fruits, *Salvia limbata* grass, *Rosmarinus officinalis* grass and *Rubus idaeus* fruits in 1:1 ratio.

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### Azərbaycan florasının immunmöhkəmləndirici bitkiləri

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İşin əsas məqsədi Azərbaycan florasında olan immunbərpaedici və möhkəmləndirici bitkilərin öyrənilməsi olmuşdur. Bitki növlərinin bir-birinə nisbətən immunbərpaedici xüsusiyyətinə görə istifadə tezliyi (Ui) və əhəmiyyəti, yeni metodlarla qiymətləndirilmişdir. Hər bir məlumat verənin konkret göstərilən bitki növləri üçün istifadəsi haqqında məlumatların ümumi sayı  $N_i$  ilə təmsil olunmuşdur. Nəticədə immunbərpaedicilərin nisbəti diaqramda göstərilmişdir: *Allium* sp. və *Thymus* sp. (0,90-0,88) daha yüksək İQ (istifadə qiymətləndirilməsi) nümayiş etdirmişdir. *Rosa* sp. (0,83), *Salvia limbata* (0,81), *Altheae officinalis* (0,80), *Glycyrrhiza glabra* (0,78), *Mathricaria* sp. (0,77), *Humulus lupulus* (0,74), *Mentha* sp. (0,60), *Sitrus* ssp. (0,27), *Capsella burssa pastoris* (0,21), *Rumex* sp. (0,18), *Sambucus nigra* və *Helichrysum plicatum* (hər biri 0,15), *Daucus carota*, *Urtica dioica* və *Asparagus officinalis* (hər biri 0,10, ən aşağı İQ) olmaqla sonrakı yerləri tutmuşdur.

**Açar sözlər:** Etnobotanika, antiviral bitkilər, immunbanika, immunbərpaedicilər

## **Иммуноукрепляющие растения флоры Азербайджана**

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Основной целью работы явилось изучение иммуномодулирующих и укрепляющих растений флоры Азербайджана. Частота использования ( $U_i$ ) и ценность видов растений по их иммуномодулирующим свойствам были оценены новыми методами. Общее количество представленных отдельными лицами данных об использовании каждого конкретного вида обозначено как  $N_i$ . Результат соотношения иммуномодуляторов, показан на диаграмме: наиболее высокая IQ (оценка использования) отмечена для *Allium* sp. и *Thymus* sp. (0,90-0,88), следующие места занимают *Rosa* sp. (0,83), *Salvia limbata* (0,81), *Altheae officinalis* (0,80), *Glycyrrhiza glabra* (0,78), *Mathricaria* sp. (0,77), *Humulus lupulus* (0,74), *Mentha* sp. (0,60), *Sitrus* ssp. (0,27), *Capsella burssa pastoris* (0,21), *Rumex* sp. (0,18), *Sambucus nigra* и *Helichrysum plicatum* (каждый по 0,15), *Daucus carota*, *Urtica dioica* и *Asparagus officinalis* (каждый по 0,10 - самый низкий показатель IQ).

**Ключевые слова:** *Этноботаника, противовирусные растения, иммуновосстановители*