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CULTIVATION OF NEW PERSPECTIVE VARIETIES OF SEA-BUCKTHORN (HIPPOPHAE RHAMNOIDES L.) AND ITS APPLICATION IN AGRICULTURE AND MEDICINE

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Abstract: It is an actual problem to plan new productive and bio-chemical species rich in substances of sea-buckthorn. In this regard wild grown form of it collected from Nakhchivan AR area and new sorts were selected after hybridization. In a result of selection, perspective form per ha was 60-70 tones, and sea-buckthorn sorts rich in lipid and essential oils, vitamins, mineral substances were planted. Production technology of oil and other extracts was invented by studying, and it was applied in medicine, agriculture, and ecological problems solution.

Key words: Sea-buckthorn, radioprotections, sea-buckthorn oil, application in agriculture, selection of new species, use in medicine.

1. Introduction

Recently in order to protect organisms from the of radiation effect radio protectors have been applied principally concerning to sulfur compounds, aminothioles and indolilalkins. Although the achievements obtained in the direction of synthetic medicines discovery, they cannot completely replace the medicinal preparation of natural origin. That is why the study of natural biological active substances with radio protector property is of special importance.

Flora of Azerbaijan is considered one of the richest countries for its species' richness. There are plant varieties for producing radio protector substances (essence-oil, lipid, lipoid, phenol compounds, pigment substances, proteins, vitamins and various amino acids). We have cultivated new varieties and forms of sea buckthorn, black caraway, basil, tarragons which are richer with their radio protector substances among these plants. Our aim in producing new varieties and forms is to get new varieties rich with protector property substances, by conducting selection in condition of the cultivation without touching the balance of natural biodiversity and to protect the species with new natural resources.

The plants with essence oil are potential radio protectors.

2. Acknowledgement

Many studies have showed that organic extracts can serve as viable and effective radioprotective agents. There has been a recent increase in their use as such because of their decreased side effects upon administration (3).

Hosseinimehr, S.J., et al. (2007) demonstrated that Radioprotective effects of hawthorn fruit extract against gamma irradiation in mouse bone marrow cells.(4)

Goel et al. studied radioprotection of human blood lymphocytes using the hydroalcoholic extract of *Aegle marmelos*. Treatment with the extract significantly reduced the percentage of micronuclei in radiation-exposed cells by inhibiting free radicals formed. Pretreatment with

Tinospora cordifolia extract also significantly reduced micronuclei in γ -irradiated mice, as well as increasing spleen CFU counts and S-phase cell levels. Total lymphocyte cell counts were found to be restored to normal 15 days after radiation and 30-day survival had increased 76.3% relative to the control. (1)

Scientists have confirmed the healing properties of holy basil, which grows in India. Basil has a very useful properties for the human body and slows the aging process. First Indian pharmacists conducted a formal study that examined the properties of basil. The results showed that an extract of a certain type of basil, known as the holy basil (*Ocinum Sanctum*), helps protect against the occurrence of free radicals - chemicals that can cause cancer of various organs, but also damage genes and nerve cells. According to experts, the holy basil growing in India and some other parts of Asia for many years been used in traditional medicine as a means to recuperate and rejuvenate. (2)

Tocopherol monoglucoside, a water soluble derivative of vitamin E offers protection against deleterious effects of ionizing radiation, both under in vivo and in vitro conditions, to biological systems. It also protected thymine glycol formation induced by gamma-radiation. (3)

The flavones, and normalize many functions of the human body – have cardio protective, antispasmodic, anti-inflammatory, radio-protective, anti-allergic, hepatoprotective, anti-sclerotic, diuretic and other actions, including the regulation of functions of the endocrine glands.

3. Discussion

Hippophae is a genus of sea buckthorns, deciduous shrubs in the family *Elaeagnaceae*. The name sea buckthorn may be hyphenated^[1] to avoid confusion with the buckthorns (*Rhamnus*, family *Rhamnaceae*).

It has three kinds. One kind of them *Hippophae* L. extended widely in nature. All spread cultures have been established on the base of this kind. Sea-buckthorn grows on the high lands and mountains where there are no thick forest lines and it is solar demandable plant. Therefore it can't live in such areas (5; 6; 7). In the Transcaucasia this sea-buckthorn grow in Georgia, Azerbaijan, Zangazur and Daralayaz (5). The kind of sea-buckthorn which grow in Azerbaijan is like tree and its height is 3-6 meter. In Ordubad region of Nakhchivan (NAR) new kind sea-buckthorn was discovered with 12-15 meter height in Saggarsu basin (6). Majority of the sea-buckthorn kinds from Europe looks like to bushes (with 1,5 meter height) and they are water demandable and firm to cold and moisture. Sea-buckthorn does not demand soil too much. They grow in soils with phosphorus, sand lands and good aeration.

Sallow-thorn (sea-buckthorn) *Hippophae* L. is a very valuable plant and it is widely used in Azerbaijan people's medicine since the ancient period. Its fruits are widely used in medical production and in different food production. A big number of demands to the sea-buckthorn makes necessary of new productive varieties selection and new gardens establishment. As the sea-buckthorn is a very plastic plant, it usually grows in cold, hot, salty, a little draught and humid environmental condition. It can be met in areas of below sea level, also in mountain areas it can grow in more than 4000 m height. The sea-buckthorn spread in crude areas and on the banks of rivers as well they usually are much thorny (the length of the thorns is 7sm). Its productivity is low (2-4 kg per tree); it is tree or, bush-shaped bisexual plant.

Physical-chemical characteristics of sea-buckthorn oil

Indicator	Zafarani	Nachcivan - 1	Oil received from seed
Specific gravity of oil in 20°C	0,970	0,921	0,950
Refraction 20°C	0,922	1,470	1,593
Acid no	3,2-6,2	10	2,4
Iodine no	74,9	83	155,0
Saponifiable matter	195-200	195	199,0
Non-saponifiable matter, %	3,28	3,2	1,85
Fatty acids, %	4,1	4,2	3,1
Rodan no	61,5	62,5	95,7
Oil mass, %	8,6 -12,3	9,6- 13,3	21,6

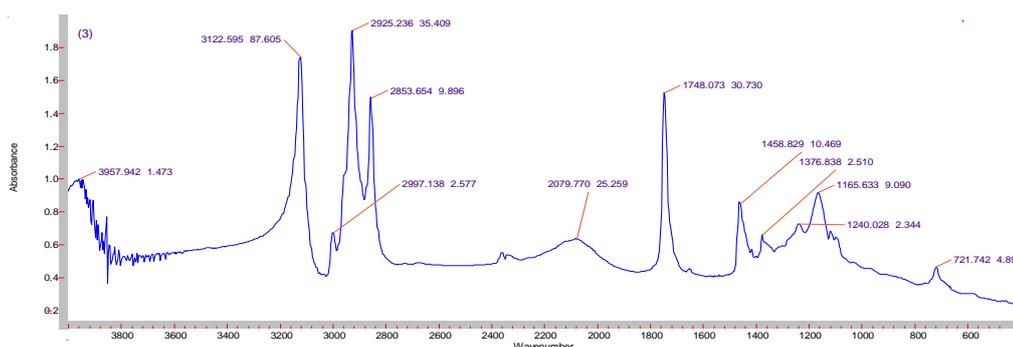


Fig. 1. IR spectrum of sea-buckthorn oil

4. Results

The advantages of Sea-buckthorn:

3-4 years old (plant) trees produce a normal product; Each year it provides a stable product:

As trees are resistant to disease and pests, their being stained is not required. Ecologically clean product is produced; Resistant to various stress and abiotic factors; It develops well in dry and wet soils; As there is nitrifying bacterium in its roots, there is no need for fertilizer, and it enriches the soil with nitrogen. Each year it forms 2-4cm humus in soil. It is highly productive, its output per hectare is more than 60 tons.

Fruit remains fresh on tree for a long time, and so it makes enable the fruit to be collected. It produces high biomass by developing rapidly.

Production of medical aimed products:

Production of pure (100%) sea-buckthorn oil (for curing infarction, carcinogen and ulcers of digestive system; Surgical-purpose (after eye, cardiovascular and other operations as ulcer-curing, sedative and disinfectant), production of oils without oil acid composition. (11). Obtainment of ointments, which are used for preventing extremity tissue damages in radiotherapy. Preparation of ointments with radioprotector properties together with other plant

extracts against radioactive radiation burns. Preparation of liquid soaps in order to wash and neutralize radioactive substances on external surface. Preparation of aerosol for curing respiratory system burns and for disposal of radionuclides from the respiratory system. Preparation of pills (tablets) and syrups that develop immunity.(6;7) Preparation of medicated suppository and tampons (against piles).

Production of vulnerary cosmetic remedies for restoring skin elasticity, for healing and smoothing out wrinkles and scars on face; Preparation of medically useful pomades (lipsticks).

Production of aromatic balsams, which develop immunity; Preparation of medically useful liqueur; Usage technology from 6 kinds of plants as an aromatizing and dye has been developed for its production. (12)

Preparation of polyvitaminous and immunity developing food products (cheese, yogurt, etc.) for soldiers and officers to use in extreme conditions. Preparation of substances with radio protector properties and which quench thirst of soldiers and officers in extreme conditions (during war). From its leaves it has been obtained and applied the oil with fat+carotene+chlorophyll.

It has been studied the methods of use from its leaves as galena preparation against dysentery. It has been studied the use of its leaves with other plant mixtures as blood-stopping and wound-healing in stomach-intestinal and internal wounds. In folk medicine its dried fruit is used to cure infarction. It has been developed fast drying technology, which doesn't lose its quality for 3 years and without loss of biologically active substances in its content.

Fruit juice is used as polyvitamine to treat more than 50 diseases.

A substance with alcoloid property, which is in its roots, is used against rodents. Balsams, which are prepared with essential oils of sea-buckthorn and tarragon, basil, mountain mint, thyme and etc., give a positive result in deseases like tuberculosis, influenza and etc. The biologically active matter (BAM), prepared with sea-buckthorn oil and extract together with other oils, has been dental initially tested and has given positive results.

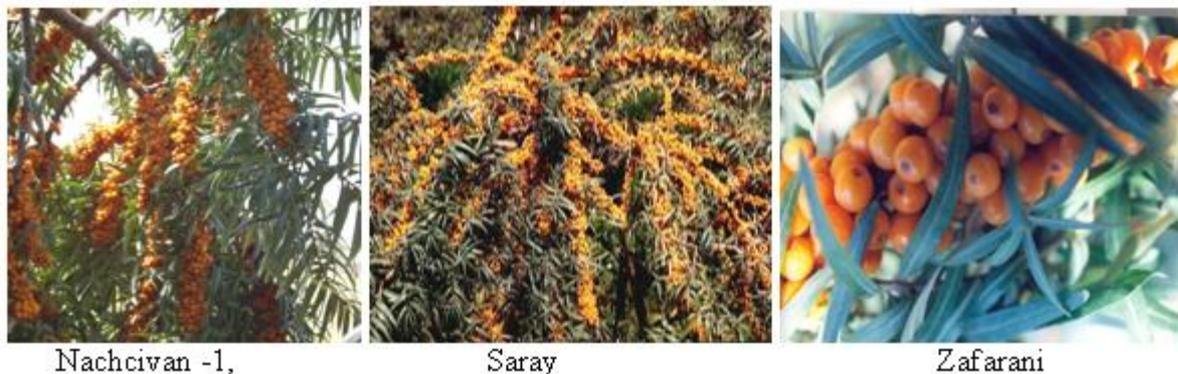
Oil fraction has been obtained to treat highmorities. Treatment period of the most serious patients is 5 days. A special substance has been produced from its leaves in order to stop bleeding in teeth. Furokumarin in leaves and fruit is used in treatment of albinism (pellagra) in skin. Pills for reducing blood pressure.

Application in industry: Production of different colors for dying food products in confectionery. Production technology of alcohol-free soft drinks has been prepared. It has been developed production technology of natural colors (yellow, green, gold, black and etc.) for dying cloth. Pure sea-buckthorn liqueur is obtained.It has been developed production technology of vodka and liqueur from its mixture with hawtorn, dog-rose and mulberry.()

Application in Food: Pasteurized thick juice; Jam, compote, fruit jelly, candy, etc. It is added to more than 70 polyvitaminous and aromatic food products, like biscuit, cake and etc. Its dried fruits are used in plov, soup instead of barbery. Production of tinned food and polyvitaminous drink (by water dilution) for tourists; Pills (polyvitamins) for cosmonauts.

Ecological Importance: The afforestation of alternative forest-belt in river's bank and river basin, prevents both landslip and erosion during floods.It develops well in contaminated air territories. It enriches air with oxygen more than other plants. Selection of beautiful decorative plants has been carried out for parks' and avenues' decoration. Wood forms may be used to make shadow. As fruits and leaves are rich with essential oils, it has disinfectant effect. Hybrid forms have been created to establish natural alternative forests. As fruits remain on trees for a long time, it is source of polyvitamin for birds' feeding. The leaves are fodder source for animals. (6;7)

Product for cosmetic: Natural cosmetics and food colors; Leaves and young shoots may be used as natural colour against hair-loss and for dying them in black. Natural lipsticks (pomades) of different colors Nourishing creams and masks for wrinkles to be smoothed; Soaps, used in shaving; Lotion preparation (ointment, used after shaving). (5)



Pic. 1. New perspective form of Sea-buckthorn.

Economic importance: It has been tested in the territory of the Nakhichevan Autonomous Republic and in Saray, Ramana zones of Absheron region in an area of 2 hectares. The saffron-colored sort in Absheron territory gives 30 kg products on average from each tree 25-40kg. It is possible to plant 50 male and 1200 female plants in one hectare territory. If the area is square and large, pollination probability of plants increases and productivity rises. The amount of oil is 8.2% in fruit in Absheron conditions.

The highest productivity in Nakhchivan züfarani is 50-60 tons per hectare, Shafa 24-30 tons per hectare, Nachcivan -1 65-70 tons per hectare (At the age of 6-8 years), Saray 36--40 tons per hectare and it has not been observed in either of world countries. The existing sorts and forms have been tested in different areas of Nakhchivan, Ordubad, Shahbuz, Sharur and plants, suitable for each climatic zone and with different maturing period have been selected. Quantity of oil in the content of forms, selected for Nakhchivan's mountainous areas, is 5-6,8%, but for lower zones is 12%. When the fruit is fully grown, the mass of oil is more than 20%.

In Nakhchivan from per hectare is obtained minimum 60 tons fruit, from it 88% clot and juice, 10-12% seeds and bark, that is there is 35-40% fatty oil in the content of seeds and bark, and by press suppression oil is obtained from seed and bark.

Net income per hectare on the basis of wasteless technology is more than 500 000 manats.

In the result, it is intended to prepare aerosol, consisted of essence oils and lipid mixtures, for respiratory system treatment in extreme conditions having radiation threat. The plants with essence oil are potential radio protectors.

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YENİ PERSPEKTİVLİ ÇAYTIKANI (*HIPPOPHAE RHAMNOIDES* L.) SORTLARININ SELEKSİYASI VƏ ONLARIN TİBBDƏ VƏ KƏND TƏSƏRRÜFATINDA TƏTBİQİ

N.R. Rzayev

Xülasə: Yeni məhsuldar və biokimyəvi maddələrlə zəngin Çaytikanı sortları yetişdirilməsi actual problemdir. Bu məqsədlə onların Naxçıvan MR ərazisində yayılmış yabanı formaları toplanılmış və hibridləşdirilərək yeni formaları seçilmişdir. Tədqiqat nəticəsində məhsuldarlığı hər hektardan 60-70 ton və tərkibi lipid və efir yağı, vitaminlər, mineral maddələrlə zəngin çaytikanı formaları yetişdirilmişdir. Onlardan alınmış yağın və digər ekstraktların istehsalı texnologiyası hazırlanmış, tibbdə, kənd təsərrüfatında və ekoloji problemlərin həllində istifadəsi öyrənilmişdir.

Açar sözlər: Çaytikanı, radioprotektor, çaytikanı yağı,kənd təsərrüfatında tətbiqi, yeni sortların seleksiyası, tibbdə istifadə.

СЕЛЕКЦИЯ НОВЫХ ПЕРСПЕКТИВНЫХ СОРТОВ ОБЛЕПИХИ (*HIPPOPHAE RHAMNOIDES* L.) И ВЫРАЩИВАНИЕ ИХ В СЕЛЬСКОМ ХОЗЯЙСТВЕ И ПРИМЕНЕНИЕ В МЕДИЦИНЕ

Н.Р. Рзаев

Резюме: Выращивание новых сортов Облепихи, богатой биохимическими веществами является актуальной проблемой. С этой целью собраны дикие формы, распространенные на территории Нахичеванской АР и их гибридизацией проводили селекции новые формы. В результате исследования выращены новые формы облепихи, производительность с каждого гектара достигнуто до 60-70 тонны и состав фруктов которой обогащен высококачественными липидными

и эфирными маслами, витаминами, минеральными веществами. Приготовлены технологии производства масел и других экстрактов, изучены их пользование в медицине, сельском хозяйстве и в решение экологических проблем.

Ключевые слова: облепиха, радиопротектор, облепиховое масло, применение в сельском хозяйстве, селекция новых сортов, использование в медицине