

GEOBOTANICAL PROSPECT/INDICATION AND ITS IMPORTANCE OF DISCOVERING DEPOSIT-FIELDS

**O.T. Zokirov¹ and M.K. Aripova²*

¹*Tashkent State Technical University, Uzbekistan*

²*National University of Uzbekistan, Uzbekistan*

**Author for Correspondence*

ABSTRACT

This article points out the study of the plants which indicate about useful variety of minerals with the help of their satellite images.

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INTRODUCTION

In our country, it is convenient to study the soil indices and the plants with satellite images that indicate about useful mineral deposited fields. Furthermore, directly linking the methods, like “Digital Geobotany” and others with the geological explorations, and their future development and improvement are also essential. The secret of plants in human life has not been fully revealed so far. As an important indicators of the landscape, vitally connecting the Earth with atmosphere, they are one of the main factors that provide information about the processes that occur and likely to occur in the biosphere. By analyzing them, it is possible to know the air, soil, groundwater contents, conditions and other processes. Geobotanical prospecting means exploring mineral or ore deposits in an area with the help of plants growing in that area. One such category of plants is called metallophytes that help explore and identify metals. Viscaria mine in Sweden was named after the plant *Silene suecica* (*syn. Viscaria alpina*) that was used by researchers to discover the ore deposits (*MinDat.org, No Date*). One of the most reliable indicators among plants is *Ocimum centraliafricanum*, the “copper plant” or “copper flower”, only found on copper (and nickel) containing soils in central to southern Africa (Brooks, 1992).

It is crucial to say that “Botanical Indication” has been formed in the relationships of the biology, geology, geochemistry and natural geography. Plants those growing on the ore vessels are low and unhealthy, and the leaves of the trees are blue, lead-gray or dark, the roots and bodies are very weak. Moreover, in 1763, M.V.Lomonosov wrote that in mountainous areas where the ore and other minerals are formed, usually the trees are unhealthy, the grasses that grows on the ore vessels are high with pale color. In the 19th-20th centuries this method was developed as a subject by Viktorov and Remezova and their schools [1988].

DISCUSSION AND CONCLUSION

It needs to be noticed that, according to their mineral compositions, the mineral deposited fields have different effects on the environment and the landscape. In certain depths, and in areas of activated earth faults, the mineral deposited fields fill the soil with too much toxic and high concentration of metal compounds (Cu, Fe, Ni, Co, B) and other elements. As a result, there would be a kind of “gloomy, sad and weak” plant groups around the deposit- fields. Using these correlations with the help of the indicator plants, in Kazakhstan: the oxide fields; in Zaire: copper, cobalt, uranium deposits; and in Brazil: iron mines were discovered [Obukhovskiy, 2008]. In addition to this, up to 60 grams of gold can be obtained from residual ashes of 1 ton of corn. It is also seen that gold concentration in the blooms of the pine-tree and the silver fir (*Abies alba*) grown in soil consisting of about 0.00002% gold, increases by 50 times [Mezhenskiy, 2004].

Review Article

Gold, silver, platinum, diamond, oil and gas, emerald and other elements, as well as deposit-fields can be identified via plants. Haggerty (2015) identified *Pandanus candelabrum* as a indicator for kimberlite pipes, a source of mined diamonds.^[3]For example: well-grown eglantine rose refers to the abundance of copper, iron and arsenic, while the rich yield of corn indicates that there is a golden vessels around. In Yakutsk grapevines, shrubs grown on diamonds have quite good view of trees than shrubs grown on lime-stones. One day, geologists in the Caspian Sea, got attracted to very large and densely grown weeds in an area. It seemed as if someone specially planted and took care of them. As they dug up, oil spilled there. Birch and poplar trees grown on uranium change their appearance on mutation, namely, the leaves will change in yellow and brown to white and green, the flowers are barren, and the bushes grow in rope. In 2018, the U.S. Department of Defense has launched a program of "The best planting techniques", and they are aiming to spend certain amounts of money for that. The goal is to use the plant- as a mineral indicator to get aware of the territory having mineral deposits, mine reserves, water resources, underground storage facilities and many other information and then use them for their own benefit. For example, it is possible to know the location of mines containing nuclear rockets, producing factories and other information through the plant-indicators that inform about uranium elements. Or, with the help of plant-indicators, it is possible to specify that whether there is any nickel, magnesium, aluminum, tungsten, molybdenum in the rival's area, and thus, by siege or sanctions, can disrupt trades associated with the goods.

Table 1: Information about plants that are indicators of some minerals [Mezhenskiy, 2004]

Plant-indicators	Chemical elements, minerals
Alpine pennycress, small flowered pennycress (<i>Thlaspi alpestre</i> L.)	Zinc, cadmium
Astragalus (<i>Astragalus</i> sp.), Melilotus (<i>Melilotus officinalis</i>), Clover (<i>Trifolium</i> sp.)	Molybdenum
Minuartia (<i>Minuartia verna</i>)	Lead, copper
Sheep's bit scabious (<i>Jasione montana</i>)	Arsenic
Sheep's fescue (<i>Festuca ovina</i>), poppy, <i>Agrostis capillaris</i> and <i>Agrostis tenuis</i>	Lead
Violet (<i>Violacalaminaria</i>), alpine pennycress, small flowered pennycress { <i>Thlaspi calaminare</i>), Silene (<i>Silene vulgaris</i>)	Zinc
Prairie sagebrush (<i>Artemisia frigida</i>)	Tungsten
Gladiolus (<i>Gladiolus</i> sp.), Gypsophila (<i>Gypsophila patrini</i>), Bladder campion or Maidens tears (<i>Silene vulgaris</i>)	Copper
Asplenium (<i>Asplenium cuneifolium</i>), Armeria maritima, commonly known as thrift, sea thrift or sea pink (<i>Armeria maritima</i>), alyssum (<i>Alyssum bertolonii</i>), Sargent Cypress (<i>Cupressus sargentii</i>)	Gold including Ni, Mg
Silver fir (<i>Abies alba</i>), pine-tree (<i>Pinus silvestris</i>), corn (<i>Zea mays</i>), Equisetum (<i>Equisetum</i> sp.)	Gold
<i>Eriogonum ovalifolium</i> known as cushion buckwheat (<i>Eriogonum ovalifolium</i>)	Silver
Pine-tree, Rosebay willowherb or fireweed (<i>Chamaenerium angustifolium</i>), blueberry (<i>Vaccinium aliginosum</i>)	Uranium
Astragalus (<i>Astragalus bisulcatus</i>)	Selenium
Brassicaceae or Winter Cress (<i>Barbarea vulgaris</i>) (Brassicaceae), lily (Liliaceae)	Sulphur
<i>Zostera noltei</i> (<i>Zostera noltii</i>), <i>Petrosimonia triandra</i> (<i>Petrosimonia triandra</i>)	Oil
Sleeping grass (<i>Mimosa</i> sp.)	Cobalt, Nickel

Rational use of space landscape, ecology, soil and geobotanical maps by analyzing spectral luminosity, background, color and other parameters of plant, soil cover and other indicators reflected in satellite images are naturally more effective for geological exploration.

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