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Mineral Components In Different Varieties Of Sweet Potato

Nozima Ismailova
Gulistan State University

Abstract. This article contains information on the amount of macro and micronutrients in the leaves of sweet potato varieties. Khazina, Khazina 2, Khazina 3, Khazina 4 and GulDU varieties of sweet potatoes were selected as the object of research. The amount of nitrate form of nitrogen in sweet potato leaves is 4.03, phosphorus - 53.2 per 100 g. potassium -44.1 mg, iron -19.8, molybdenum -56.3, sulfate -93.1, boron -0.9, zinc -0.43, chlorine (mg/l) - 19.9 and copper 1.80 mg. It was noted that the majority of microelements was sulfate ion. It was found that the new varieties Khazina-2 and Khazina 4 of Batat differed in the amount of macro and micronutrients compared to other varieties.
Keywords. micro and macro elements, sweet potato plant, sweet potato varieties, chemical composition of sweet potato plant, fertility in saline environment.

Introduction.

Sweet potato *(Ipomoea batatas)* is one of the plants with special importance in food industry, animal husbandry and medicine. It is noted that sweet potato tubers are eaten cooked and fried, and the starch extracted from the tubers is used in medicine. At the same time, a salad was prepared from the young leaves of the sweet potato plant, and its stems and stems were used as fodder for livestock. Important biological properties of the sweet potato plant are characterized by its rich content of vitamins. It has been found that sweet potato contains vitamins such as Vitamin A, Vitamin V1, Vitamin V2, Niacin, Vitamin V5, Vitamin V6, and Vitamin C. Sweet potato contains macro elements: (in 100 g of sweet potato) potassium - 816 mg, calcium - 17 mg, magnesium - 21 mg, sodium - 9 mg, phosphorus - 55 mg and microelements: iron - 0.54 m, manganese - 397 mg, copper - 178 mg., selenium - 0.7 mg, zinc - 0.24 mg. It is noted that sweet potato is grown on more than 7.4 million hectares of cultivated land worldwide, and the average yield is from 12 t\hectare to 36.0 t\hectare [1,2].

Dry matter content of sweet potato is 11.52%, 12.27% protein, 2.39% oil, 19.95% fiber, 8.67% ash, 43.21% AEM, 1.03% calcium, 0.38% phosphorus, 3.0% glucose, 5.0% sugar, 20% starch, 0.04% essential oil, 4.6% organic and 10.52% glycyrrhizic acids, 14.84% saponins and 9.72% dubious substances were recorded [3].

New varieties have a great role in increasing the productivity of the sweet potato plant. In recent years, new varieties of sweet potatoes have been created. It was found that it takes 10 years to create new varieties of sweet potato, and 50,000 tubers are needed to start the selection process [4].

In recent years, in our republic, researches are being carried out on improving the technology of growing sweet potato, creating new varieties and determining their resistance to external environmental conditions. The resistance of the sweet potato plant to saline environment was determined in laboratory conditions. A 20-250 mM solution of sodium chloride salt was used for this purpose. As a result, when the solution concentration was 20mM, the root length of the sweet potato plant was equal to 3.5-3.9cm, while in the control it was equal to 3.7-4.1cm. When the concentration of the solution is equal to 50mM, these indicators are 3.3-3.8cm, 100mM - 2.1-2.6cm, 150mM - 0.3-1.2cm, and 250mM - 0.5-0.7cm. When the concentration of the solution was equal to 250 mM, it was noted that Jerusalem artichoke plant root length of 0.9-1.7 cm and potato plant necrosis. Based on these data, it was noted that the sweet potato plant is more adaptable to the saline environment than potatoes [5].

In the conditions of our republic, scientific research works are being carried out to improve the technologies of cultivation of new and introduced varieties of sweet potato. In the conditions of the Samarkand region, the new sweet potato varieties Sochakinur, Toyloki, Har-bey and Filial in the scheme of 70x25x1 and 90x20x1 cm, the rate of sowing seeds is 55500-57100 thousand pieces per hectare, and the rate of mineral fertilization is $N_{200}P_{160}K_{100}$ kg/hectare, 50 t/ hectare, repeated crop (20 -June 30) when planted as 35-40 t/ hectare was found [6].

According to the above information, it can be seen that it is possible to obtain a high yield of sweet potatoes in the conditions of our Republic. However, the biochemical composition of the newly created varieties of

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sweet potato, including the amount of macro and microelements, has not been fully studied based on the natural climatic conditions of the region. In this condition, the amount of macro and micronutrients is important. Macro and microelements are involved in the biogenesis of biologically active substances, and some of them enter into the composition of enzymes and affect their activity. Based on this, this study was conducted. The main purpose of the research was to determine the amount of macro and micronutrients in sweet potato varieties. Such studies were conducted for the first time in the conditions of Syrdarya region.

Research object and methods.

A difference in the amount of trace elements was observed in the sweet potato leaf. This can also be seen from the data in the table. Nitrate form of nitrogen (NO_3-N) was equal to 4.03 mg on average, its minimum value was -3.2 mg, maximum value was equal to 5.2 mg. According to this indicator, the studied varieties differed. This can be seen from the data in Figure 1.

Table 1. The amount of macro and micronutrients in the leaves of sweet potato varieties

Statistical indicators	Amount of macro and micronutrients, in mg/100 g									
	NO^-_3-N,	P_2O_5	K_2O	Fe	Mo^{6+}	SO_4^{2-}	B,	Zn	Cl^- mg/l	Cu
Average	4.03 ±0.3	53.2± 3.9	44.1± 6.8	19.8± 1.6	56.3± 5.1	93.1 ±5.8	0.9 ±0.1	0.43 ±0.1	19.9± 1.8	1.8± 0.2
Minimum	3.2	39.5	30.7	14.30	44.3	71.6	0.72	0.35	13.8	1.3
Maximum	5.4	61.3	70.3	23.7	69.4	104	1.12	0.52	25.6	2.2

It can be seen that the lowest level of nitrogen was recorded in the Khazina 3 variety (3.2mg), while the maximum level was recorded in the Khazina 2 variety (5.4mg). Other varieties had an intermediate indicator of the nitrate form of nitrogen. Phosphorus content (P_2O_5) was 53.2 mg on average in the cross-section of varieties, a relatively low indicator was observed in Khazina 3 variety (39.5 mg), maximum in Khazina 2 variety (63.1 mg). It was noted that the amount of potassium (K_2O) is higher in sweet potato leaves compared to the amount of phosphorus and nitrogen. The average of the studied varieties was equal to 44.1 mg, while its minimum value was 30.7 mg in Khazina 3 variety, and 70.3 mg was recorded in Khazina 2 variety.

It was noted that the average amount of iron from macro elements is equal to 19.8 mg. A difference was observed between varieties according to this indicator. This can also be seen from the data in Figure 2. In the section of studied varieties, the lowest indicator was recorded in Khazina 3 variety, its value was equal to 14.3 mg. A relatively high indicator was found in the Khazina 4 variety, and its indicator was equal to 104.0 mg. Amount of Molybdenum (Mo^{6+}) cation

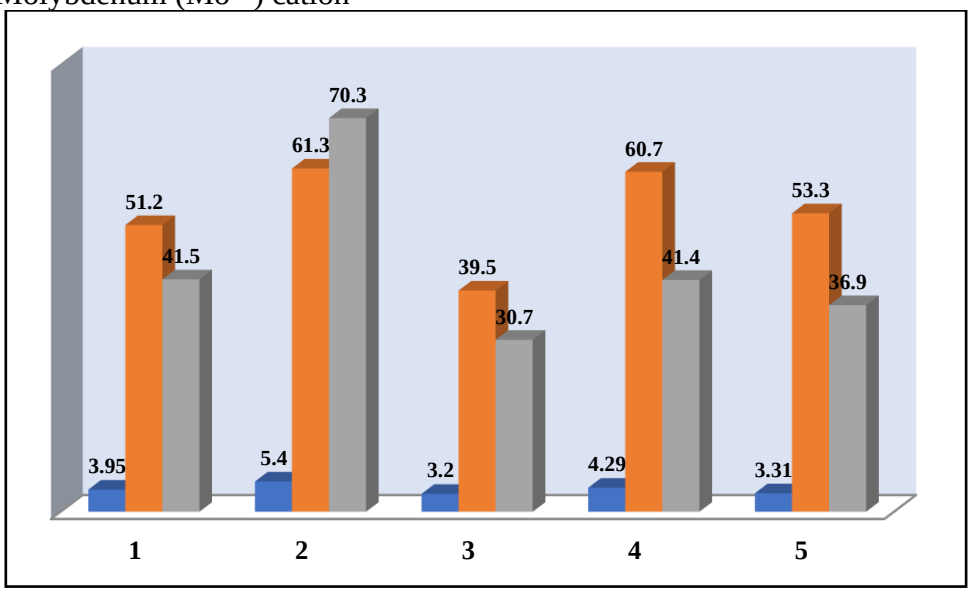

Figure 1. Amount of macro elements NO_3-N, P_2O_5 and K_2O in sweet potato leaves (1g/100g).

Note: 1- Khazina; 2- Khazina 2; 3- Khazina 3; 4- Khazina 4; 5- GulDU

average was 56.3 mg. In the cross-section of varieties, the lowest indicator was 44.3 mg in the Khazina-3

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variety, while the maximum indicator was recorded in the Khazina 2 variety and was found to be equal to 69.4 mg. Sulfate ion (SO_4^2) was found to be more abundant than other elements. On average

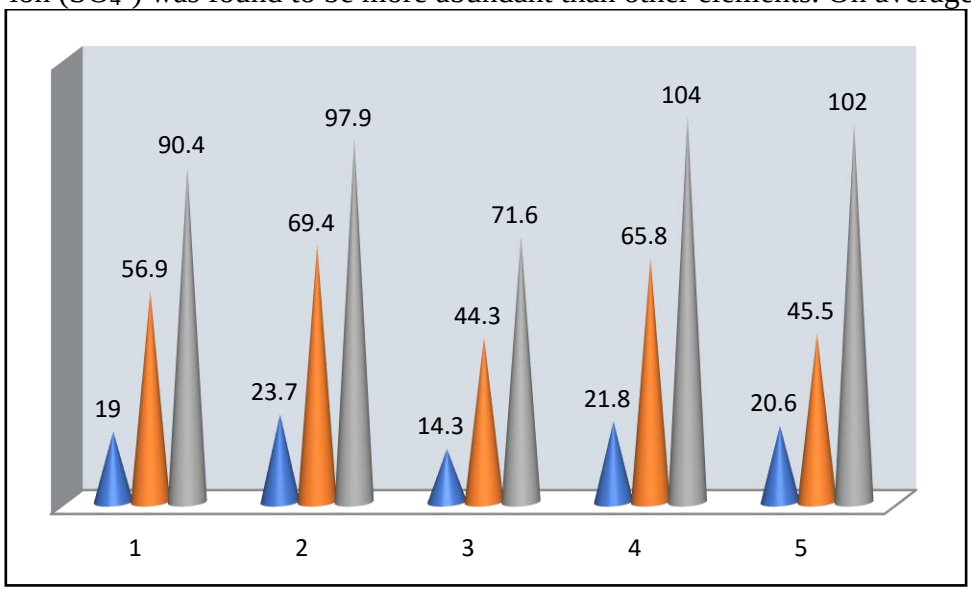

Figure 2. Amount of elements such as Fe, Mo^{6+}, SO_4^2- in the leaves of Batan varieties (mg/100g).
Note: 1- Khazina; 2- Khazina 2; 3- Khazina 3; 4- Khazina 4; 5- GulDU

was equal to 93.1 mg in the section of studied varieties. In Khazina 3 variety, this indicator is -71.6mg, a relatively high indicator was found in Khazina 4 variety, its amount was equal to 104 mg.

The amount of microelement boron (B) in the sweet potato plant was equal to 0.9 mg, and varied from 0.72 to 1.12 mg in the section of varieties. According to this indicator, indicators of Khazina 2 and Khazina 4 varieties were equal to 1.1 and were higher than others (Fig. 3). It was observed that the amount of zinc element is equal to 0.43, the lowest indicator is -0.35 and the highest indicator is equal to -0.52 mg. Indicators of chlorine ion varied across varieties. The highest indicator was recorded in Khazina 2 variety and equaled 25.6 mg/l, while the lowest indicator was recorded in Khazina 3 variety equal to 13.8 mg/l. The average value of copper ion is equal to 1.80 mg, and it is found that it is equal to 2.3 mg in Khazina 4-variety.

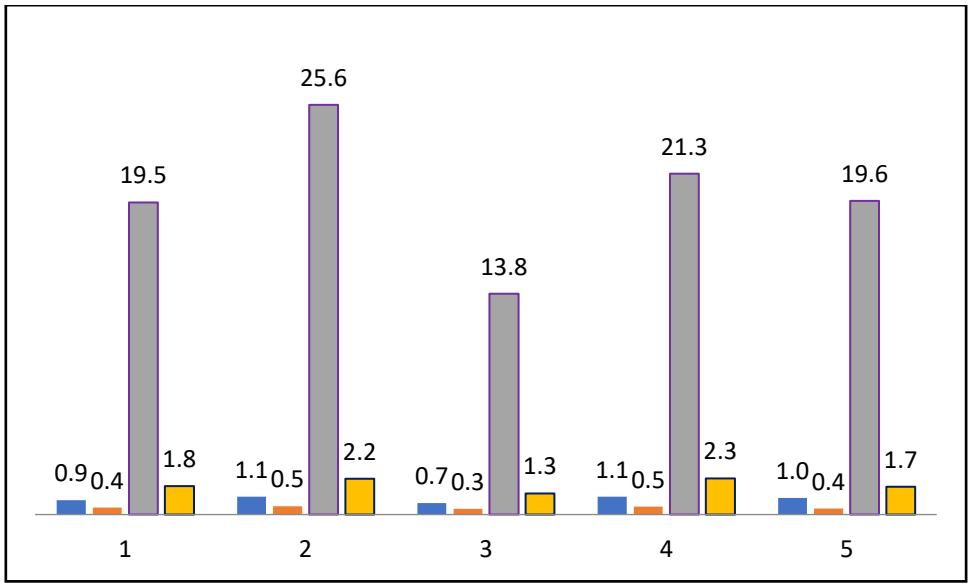

Figure 3. The amount of elements such as B, Zn Cl- Cu in the leaves of Batan varieties (1g/100g).
Note: 1- Khazina; 2- Khazina 2; 3- Khazina 3; 4- Khazina 4; 5- GulDU

Based on the results of the research, it was determined that the most macro and microelements in sweet potato are sulfates (Figure 4). Its share was 31.7% (in relation to the amount of micro- and macroelements studied in the study). The next places were occupied by P_2O_5 (18.1%), molybdenum-Mo^{6+} (19.2%) and potassium K_2O (15.0%). Zinc (0.1%) was found to be the least micronutrient in sweet potato leaf.

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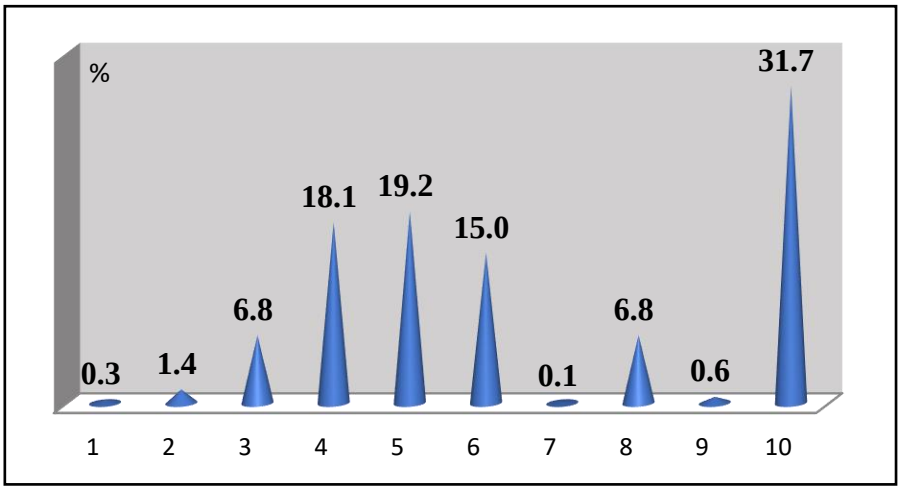

Figure 4. Percentage of micro and macro elements in Bata leaf, %

1.V, 2- NO-3-N; 3- Fe; 4-P_2O_5; 5- Mo^{6+}; 6- K_2O; 7- Zn; 8- Cl-; 9- Cu; 10 SO_4^{2}-

The following conclusions were drawn based on the data obtained on the determination of the amount of macro and microelements in the leaves of new varieties of sweet potato:

Conclusion.

1. It was determined that the amount of nitrogen (NO-3-N) in the sweet potato leaf is 4.03 mg, phosphorus (P_2O_5) 53.2 mg, and potassium (K_2O) 44.1 mg. According to the amount of this indicator, Khazina-2 variety differed from other varieties.
2. It was noted that the average amount of iron is 19.8, molybdenum (Mo^{6+}) cation -56.3 mg, sulfate ion (SO_4^{2}) -93.1 mg. According to this indicator, Khazina 3 and Khazina-4 grades are higher than other grades.
3. It was determined that the average amount of boron microelement is 0.9 mg, zinc -0.43, chlorine ion 19.9, copper 1.80 mg.
4. It was found that sulfate is the most abundant macro and micronutrient in sweet potato leaf. Its share was 31.7%, P_2O_5 18.1%, molybdenum-Mo^{6+} 19.2% and potassium (K_2O) -15.0% compared to studied macro and microelements.

References.

1.https://doc-tv.ru/articles/batat_polza_i_vred_dlya_organizma_sostav_ i_lecheb
2.https://ru.wikipedia.org/wiki/%D0%91%D0%B0%D1%82%D0%B0%D1%82
3.Макиев. О. Н. Содержание биологически активных веществ в батате культурном (Ipomoea batatas (L.) Lam.), стевии Ребауди (Stevia rebaudiana Bertoni), солодке щетинистой (Glycyrrhiza echinata L.) в условиях РСО-Алания и их практическое использовани/ афто. Рефер. Диссер. Со исканиди канд биоюнаук. Владикавказ. 2012. С.22
4.Бобков В.С. Селекционный процесс батата (Ipomoea batatas Lam.) в NARO – National Agriculture Research Organization, Япония / В.С. Бобков, О.Е. Ханбабаева, Е.А. Вертикова [идр.] // Международныйнаучно - исследовательский журнал. — 2023. — №11 (137). — URL: https://research-journal.org/archive/11-137-2023-november/10.23670/IRJ.2023.137.6
5.Қўшиев Ҳ., Кулиев Т., Эшкувватов А. Ўсимликлар миқдорий белгилари ўртасидаги корреляцион боғланишлар, ўзгарувчанлик ва детерминация. (Монография). -Тошкент: “Наврўз” нашриёти, 2017. 147 б.
6.Остонакулов Т.Э. Оценка сортов батата и разработка технологии их возделывания в Узбекистане/ Т.Э. Остонакулов, А.А. Шамсиев, И.Х. Амантурдиев [и др.] //Международный научно-исследовательский журнал. - 2022. -№4 (118). - URL:https://research-journal.org/archive/4-118-2022-pril/ocenka-sortov-batata-i-azrabotka-texnologii-ix-vozdelyvaniya-v-uzbekistane.
7. N.A.Ismailova. Chlorophyll quantity in the leaves of sweet potato (Ipomoea batatas (L.) Lam.) in the condition of Uzbekistan.E urAsian Journal of BioSciences
Eurasia J Biosci 14, 3557-3560 (2020)
8. Feruza Gaibnazarova, Nilufar Ruzikulova, Nargiza Safarova,, Khilola Khakberdiyeva, and Ulugbek Musabekov “Conchological variation of widely common species of terrestrial mollusks of Uzbekistan” E3S Web of Conferences https://doi.org/10.1051/e3sconf/202449401021 494 AEES2023

ISSN NO: 2770-8608
November 2024

9. Feruza Gaibnazarova. Faunistic spectrum of terraneous mollusks of Uzbekistan and bordering territories E3S Web of Conferences 392, 02040 (2023) https://doi.org/10.1051/e3sconf/202339202040 RSE-II-2023
10. Пазилов А., Гаибназарова Ф., Саидов М. Закономерности вертикального распространения наземных моллюсков Узбекистана и сопредельных территорий. Ташкент: Фан, 2014. Б-11

11. Pazilov A., Gaibnazarova F. Geographical variability of conchological features of the terrestrial mollusk Pseudonapaeusaptechus // Proceedings of the VIII International Scientific and Practical Conference.- Krasnodar, 2014.- pp. 128-130.

12. Gaibnazarova F. The nature of the variability of the signs of the sexual apparatus of Pseudonapaeus Albiplicata From the Chatkal, Kuraminsky Ridges - Guliston Davlat Aksborotnomasi University, No. 3. 2015 Б-21

13. Gaibnazarova F., Pazilov A. On the fauna of terrestrial mollusks (gastropods, Puymonata) of the Kugitangtau ridge. Proceedings of the conference "Ecology, Evolution and systematics of animals" November 13-16, 2012 Б-13-16
14. Gaibnazarova F., Pazilov A. Conchological variability of terrestrial mollusks Nanosignals of gibbulinopsis of Turkestan and Zarafshan ridges. Zoological studies of the regions of Russia and adjacent territories materials for the III International Scientific Conference. Nizhny Novgorod - 2014.
15. Pazilov A. Gaibnazarova F., Karimova H. Complexes of terrestrial mollusks in various biotopes of the Zarafshan ridge JOURNALNX - Interdisciplinary peer-reviewed journal ISSN: 2581-4230, Website: journalnx.com, June 18-19, 2020.
16.Pazilov A., Gaibnazarova F., Karimova x alien species Monacha carthusiana (Mollusks, gastropods, pulmonary) as a new intermediate host of the nematode cystocaulus ocreatus in uzbekistan. Naukoviy visnik Uzhhorod universitetu Seriya Biologiya, Vipusk 40, 2016: Б 83-85.
17. .Gaibnazarova F. The nature of the variability of the signs of the sexual apparatus of Pseudonapei albiplicate from the Chatkal and Kuramin ranges. Biological Sciences of Kazakhstan No. 3, 2014.
18. Gaibnazarova F. Biological diversity of terrestrial mollusks of the Surkhan-Sherabad valley and its surrounding mountain ranges // Naukovi zapiski Ternopil National Pedagogical University im. Volodimira Gnatyuk. Ser. Biologiya Ternopil : TNPU, 2012. - Vip. 2 (51), Spec. vip. : Moluski: results, problems and prospects doslizhen. - pp. 54-57– - Bibliogr. in kinci art.
19. Pazilov A., Gaibnazarova F. Conchological variability of the terrestrial mollusk Signature of gibbulinopsis from the Baysuntau, Kugitangtau and Babatag ridges. "Ecology, evolution and systematics of animals". Ryazan -2012 Materials of the international scientific and practical conference
20.Pazilov A., Gaibnazarova F. Species composition and variability of terrestrial mollusks of the genus Cochlicopa of Uzbekistan and adjacent territories / Ecological features of biological diversity: proceedings of the 5th International Conference - Hadjent, 2013 - pp.96-97.
21.Pazilov A., Gaibnazarova F. Population variability of conchological features of the terrestrial mollusk Pseudonapei secalin from the Turkestan ridge// Theory and practice of current research. Materials of the Vl International Scientific and Practical Conference.- Krasnodar, 2014. pp. 45-47.18.
22.Goibnazarova F., Pazilov A. Conchological variability of terrestrial mollusk Nanosignals of gibbulinopsis in Turkestan and Zarafshan ridges//Zoological studies of the regions of Russia and adjacent territories. III International Scientific Conference.- Nizhny Novgorod, 2014. pp.35-37.
23.Gaibnazarova F., Karimova H. A variety of dry mollusks common in the regions of Uzbekistan and adjacent to it // Annals of R.S.C.B., ISSN: 1583-6258, Volume 25, Issue 6, 2021, pp. 2233-2242. Received April 25, 2021; Accepted May 08, 2021.
24. F Gaibnazarova. A variety of dry shellfish is common in the regions of Uzbekistan and adjacent to it. Annals of the Romanian Society for Cell Biology 25 (6), 2828-2834
25. Gaipnazarova Feruza. Distribution of land snail by vertical zones and biotopes of Pseudonapaeus species in Fergana, Chatkal and Kurama mountain range // European science review. – 2016. – №. 1-2. – pp. 3-4
26.А Пазилов, Ф Гаибназарова, М Саидов - Ташкент. из.«Фан», АН РУз, 2014

ISSN NO: 2770-8608
November 2024

27.Гаибназарова Ф. Географическая изменчивость конхологических признаков наземного моллюска Pseudonapaeus aptechus //современная наука: тенденции развития. Материалы Vlll Международной научно-практической конференции. – 2014. – С. 128-130.