**GABARITO-ESPELHO**

**PROVA 1**

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NOTA: \_\_\_\_\_\_/100

Leia o texto abaixo e responda as questões.

Research Progress on Elements of Wild Edible Mushrooms

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1. Large fungi capable of forming hard fungal tissue or large fleshy masses are called mushrooms and are widely distributed throughout the world. Among the 16,000 recognized edible mushrooms, about 7000 can be eaten by humans, about 3000 are eaten by humans, and about 700 are considered to have certain medicinal value. China is one of the world’s four oldest civilizations, and it is also the earliest country to recognize and take advantage of edible mushrooms. Its history can be traced back to the Yangshao culture period from 4000 BC to 3000 BC.
2. Wild edible mushrooms are also regarded as a delicacy in many countries in Eastern and Central Europe. Edible mushroom picking in the Czech Republic has become a “hobby of the whole people,” and statistics show that the average amount of edible mushrooms collected per household reaches 5.6 kg per year. Wild edible mushrooms are popular products on the market and are extremely loved by consumers, not only because of their delicious taste but also because of their nutritional value. Many vegans all over the world cannot obtain animal protein to supplement their nutritional needs, so edible mushrooms have become the best food resource for them to obtain protein. This is because of the high branched-chain amino acids obtained in mushrooms, which are generally found only in animal proteins.
3. In some poorer developing countries, such as Nigeria, it is very difficult for most low-income families to obtain protein through beef and fish, so edible mushrooms have become a source of supplemental protein and an economic source for low-income families. Edible mushrooms not only have nutritional value but also have certain medicinal value. Eating them every day can improve the immune system of the human body to achieve the effect of resisting diseases. Mushrooms have been shown to have medicinal properties, and studies have shown that the beta-glucan in mushrooms may have a cholesterol-inhibiting effect and hypocholesterolemic activity.
4. Trace elements are needed by the human body and play an extremely important role. For trace elements, too much or too little absorption will have different degrees of impact on the human body. Heavy elements are always harmful to human health. Mushrooms contain many essential trace elements and are highly enriched in heavy metals (compared to green plants and artificially cultivated edible mushrooms).
5. There are many different species of edible mushrooms and significant differences in the levels of essential trace elements and heavy metals contained in the fruit bodies. Soil background values and geochemistry are the main factors affecting the elemental content of fruit bodies, especially wild edible mushrooms growing near highways, industrial areas, chemical plants, smelters, etc., which often have excessive heavy metals. In addition, different processing methods can also have some influence on the elemental content of fruit bodies. In this paper, the contents of four essential trace elements of iron, manganese, zinc, and copper and four harmful heavy metals of cadmium, lead, mercury, and arsenic in nearly 400 species of wild edible mushrooms from 10 countries are reviewed for the first time.
6. The amount of trace elements absorbed by the human body is limited, and too much or too little absorption will have different degrees of impact on the human body. When the amount of trace elements required by the human body exceeds the amount required by physiological functions, toxic effects will occur. At the same time, when the amount of trace elements absorbed is lower than the supply required by the human body, there will be different degrees of harm. Therefore, when taking essential trace elements from edible mushrooms, uncontrolled intake will eventually lead to damage to body function. Wild-grown edible mushrooms are rich in protein and vitamins, and can supplement essential trace elements for the human body, which makes edible mushrooms become hot-selling products on the market and popular with consumers. Their fruit bodies contain not only a large number of essential trace elements but also harmful elements, such as lead, cadmium, mercury, and arsenic. When people eat edible mushrooms, it is necessary to pay attention to the intake and not ignore the harm caused by improper intake of elements. When the dietary reference intake provided by the FAO/WTO is taken as the food guide, the intake of human nutritional elements is guaranteed to be within the safe range.
7. In the long history of human development, the gift of nature is the most primitive power of mankind. Human beings have today’s situation due to nature. Humans blindly seeking development has led to the environment being greatly damaged. Yangzhong is one of the fastest-developing regions in China. Since 1997, Yangzhong has changed rapidly from a traditional agricultural economy to an industrial economy. The process of transformation gave birth to several industries, such as metallurgy and chemicals, which produced all kinds of toxic substances that were released into nature. All countries around the world cannot develop without these industries, and all the pollutants produced are left to nature for slow decomposition. This has led to the accumulation of harmful elements in varying degrees during the growth of edible mushrooms growing near metallurgical plants, chemical plants, industrial areas, etc. This phenomenon has led to consumers loving and hating edible mushrooms, as the safety risks involved cannot be ignored.
8. As a result, some researchers are keen to determine the metal content of edible mushrooms growing near such areas. Mleczek et al. determined the differences in elemental content of Boletus badius (note: this is a synonym of Imleria badia) grown in uncontaminated acidic sandy soil and contaminated alkaline flotation tailing sites in Poland. The results showed that the accumulation of most elements in the samples grown in the contaminated area was higher than in the samples grown in the uncontaminated area. Svoboda et al. collected 56 samples of 23 wild-grown edible mushrooms from a heavily polluted area in eastern Slovakia from 1997 to 1998, and determined the element content of the fruit bodies by atomic absorption spectrometry. In the past, this area was seriously polluted by polymetallic ore mining and smelting and mercury smelters and copper smelters from 1963 to 1993. The results showed that, by comparing with the background value, the accumulation of mercury in fruit bodies of edible mushrooms was the most serious, followed by the accumulation of cadmium.
9. In an investigation of the processing methods of edible mushrooms, Ziarati et al. conducted experiments on A. bisporus of Iran, compared and analysed the essential mineral elements contents of raw A. bisporus, cooked A. bisporus, fried A. bisporus, and microwaved A. bisporus and found that the average contents of zinc, copper and iron in fried A. bisporus increased. The average contents of zinc, copper, and iron in A. bisporus treated by microwave significantly decreased. After the A. bisporus was fried again, the manganese content increased again, but after microwave treatment, the manganese content decreased. After further analysis, it was concluded that the content order of manganese and copper in fruit bodies of A. bisporus after different processing methods was fried > cooked > raw > microwave. The order of iron content was fried > raw > cooked > microwaved, zinc content fried > cooked > microwaved > raw, and magnesium and calcium raw > fried > cooked > microwaved. It can be seen that different cooking methods have a certain influence on the mineral element content of A. bisporus. The content range of Fe, Cu, Zn, and Mn in the fried state tends to be higher, all of which are higher than that of A. bisporus in the raw state. However, the magnesium and calcium contents of A. bisporus in the raw state are higher than those in other states.
10. From the above study, it is known that high-temperature processing (frying) can increase the average elemental content of mushrooms, while medium or low temperature is much less effective. This may be due to the fact that the elemental content of mushrooms is elevated due to the highwater loss in the mushrooms. However, microwave treatment does not seem to follow this pattern, as in the study of Ziarati et al., the elemental content of selenium, copper, and manganese after microwave treatment was lower than the elemental content of unprocessed mushrooms. The elemental contents of magnesium and calcium were lower than those of unprocessed mushrooms under frying, boiling, and microwaving, and again did not follow the pattern of increasing elemental content with water loss. It is concluded that the variation in elemental content values may be related to different processing methods. For reducing the elemental content of heavy metals, the most suitable way is high-temperature blanching.
11. Summarizing previous studies, it was found that the differences of the four beneficial elements in wild edible mushrooms were mainly influenced by their own element enrichment capacity and environment. There are several conclusions, as follows: 1. the content of some elements in the soil substrate is positively correlated with the content of fruit bodies; 2. the ability of different species of elements differs—even if the concentration of some elements in the soil substrate is high, there is no high enrichment in the fruit bodies; 3. mushroom fruit bodies are affected by environmental pollution to some extent; 4. the elemental content in the mushroom caps may be higher than in the stipes.
12. Although there are articles related to the study of the effects of elemental processing methods of wild mushrooms, the range of species studied is not large. The range of species could be expanded in the future to provide a reference for the edible mushroom processing industry and consumers’ daily consumption. In addition, pickers and consumers should be wary of wild edible mushrooms growing near industrial areas, highways, smelters, chemical plants, etc. These are not recommended for picking and consumption. Species with strong heavy metal enrichment capacity should be taken seriously and avoided as much as possible.

(Extracted and adapted from: <https://www.mdpi.com/2309-608X/8/9/964>)

As questões de 1 a 5 são de múltipla escolha. Para cada questão será aceita apenas uma resposta. (Cada questão vale 6, totalizando 30 pontos de 100)

1. De acordo com o parágrafo I, é correto afirmar:
2. Dentre todos os tipos de cogumelos reconhecidos, apenas 3.000 são comestíveis para os humanos.
3. Dentre todos os tipos de cogumelos reconhecidos, cerca de 3.000 são recomendados para consumo humano.
4. Dentre todos os tipos de cogumelos reconhecidos, apenas 7.000 não são comestíveis.
5. Dentre todos os tipos de cogumelos reconhecidos, 16.000 espécies são comestíveis.
6. **Dentre todos os tipos de cogumelos reconhecidos, cerca de 7.000 são recomendados para o consumo humano.**
7. Sobre os cogumelos selvagens comestíveis, pode-se afirmar (parágrafo II):
8. Foram encontrados primeiramente na Europa central e ocidental.
9. **São apreciados não apenas pelo sabor, mas também pelo valor nutritivo.**
10. Foram introduzidos na República Checa pelos veganos como substituto da proteína animal.
11. São a fonte de proteína mais utilizada por veganos em todo o mundo.
12. Estatisticamente, são colhidos 5,6 kg por pessoa por ano na República Checa.
13. Segundo o parágrafo III, aponte a única afirmação correta.
14. Em alguns países subdesenvolvidos, como a Nigéria, os cogumelos representam a maior fonte de proteína na alimentação de famílias de baixa renda.
15. Em alguns países subdesenvolvidos, como a Nigéria, os cogumelos são consumidos como maior fonte de nutrientes medicinais.
16. **Em alguns países subdesenvolvidos, como a Nigéria, os cogumelos se tornaram uma fonte suplementar de proteína em substituição de fontes mais caras, como peixe e carne.**
17. Em alguns países subdesenvolvidos, como a Nigéria, o cultivo de cogumelos se tornou a principal fonte de renda de famílias mais pobres.
18. Em alguns países subdesenvolvidos, como a Nigéria, a maior fonte de proteína ainda é de origem animal, apesar do aumento no consumo de cogumelos.
19. De acordo com o parágrafo IV, está correto afirmar:
20. Os cogumelos possuem poucos oligoelementos e muitos minerais pesados.
21. **Os cogumelos são ricos em microelementos essenciais para o corpo.**
22. Os cogumelos são ricos em macro e microelementos quando cultivados corretamente.
23. Os cogumelos podem representar um perigo à saúde humana se cultivados artificialmente devido a sua alta quantidade de macro elementos.
24. Os cogumelos concentram maior quantidade de oligoelementos que de macro elementos.
25. Indique a única frase correta de acordo com o parágrafo V:
26. **Os principais fatores que afetam a qualidade do corpo do cogumelo são o tipo do solo e a geoquímica.**
27. O método de processamento dos cogumelos vai de acordo com a quantidade de metais pesados em seu conteúdo.
28. Cogumelos selvagens comestíveis tendem a crescer mais facilmente perto de rodovias e áreas industriais.
29. Os cogumelos selvagens são os mais ricos em ferro, zinco, manganês e cobre.
30. Há 400 tipos de cogumelos ricos em cádmio, chumbo, mercúrio e arsênio encontrados apenas em 10 países.

Responda as questões a seguir em língua portuguesa. (Cada questão vale 8, totalizando 40 pontos de 100)

1. O que explica a alta popularidade e o interesse mercantil nos cogumelos comestíveis (parágrafo VI)?

***Wild-grown edible mushrooms are rich in protein and vitamins, and can supplement essential trace elements for the human body.***

***(Cogumelos selvagens comestíveis são ricos em proteínas e vitaminas e podem suprir os microelementos para o corpo humano).***

1. Porque ainda há uma certa resistência sobre o consumo de cogumelos (parágrafo VII)?

***…the accumulation of harmful elements in varying degrees during the growth of edible mushrooms growing near metallurgical plants, chemical plants, industrial areas, etc.***

***(devido ao acúmulo de elementos danosos em várias gradações durante o cultivo de cogumelos comestíveis próximo a usinas metalúrgicas e químicas e áreas industriais, etc).***

1. A que resultados chegaram os estudos conduzidos na Eslováquia (parágrafo VIII)?

***The results showed that, by comparing with the background value, the accumulation of mercury in fruit bodies of edible mushrooms was the most serious, followed by the accumulation of cadmium.***

***(Os resultados mostraram que, em comparação com o valor do tipo do solo, o acúmulo de mercúrio no corpo de cogumelos comestíveis foi o mais sério, seguido pelo acúmulo de cádmio.)***

1. O parágrafo IX relata uma investigação conduzida sobre diversas formas de processamento de cogumelos. A que conclusão chegou este estudo?

***It can be seen that different cooking methods have a certain influence on the mineral element content of A. bisporus.***

***(os diferentes métodos de cocção exercem certa influência nos elementos minerais contidos no cogumelo).***

1. Qual é a melhor forma de reduzir a quantidade de metais pesados contidos nos cogumelos (parágrafo X)?

***For reducing the elemental content of heavy metals, the most suitable way is high-temperature blanching.***

***(Para reduzir o conteúdo elementar de metais pesados, a forma mais adequada é escaldar em alta temperatura.)***

Tradução –

Converta para o português a passagem a seguir extraída do texto em questão (total de 30 pontos de 100):

Although there are articles related to the study of the effects of elemental processing methods of wild mushrooms, the range of species studied is not large. The range of species could be expanded in the future to provide a reference for the edible mushroom processing industry and consumers’ daily consumption. In addition, pickers and consumers should be wary of wild edible mushrooms growing near industrial areas, highways, smelters, chemical plants, etc. These are not recommended for picking and consumption. Species with strong heavy metal enrichment capacity should be taken seriously and avoided as much as possible.

(**Embora existam artigos relacionados ao estudo dos efeitos de métodos elementares de processamento de cogumelos silvestres, a gama de espécies estudadas não é grande. A gama de espécies pode ser ampliada no futuro para fornecer uma referência para a indústria de processamento de cogumelos comestíveis e o consumo diário dos consumidores. Além disso, catadores e consumidores devem ter cuidado com os cogumelos silvestres comestíveis que crescem perto de áreas industriais, rodovias, fundições, fábricas de produtos químicos, etc. Estes não são recomendados para colheita e consumo. Espécies com forte capacidade de enriquecimento de metais pesados ​​devem ser levadas a sério e evitadas ao máximo.**)