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Study of phenolic and mineral components of potato tuber (*Solanum tuberosum L*) grown in Oued Souf region TAMMA Nouredine

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ABSTRACT

The chemical detection of the potato's secondary metabolites showed that the extracts contained phenols and flavonoids. The phenolic extract that recorded the highest yield of the potato peel extract of the Al-Trifaoui region was 3.072%. By estimating the total content of phenols using the Folin-Ciocalteu method and estimating the total content of flavonoids using AlCl₃ and by UV and visible spectroscopy, it was found that the potato extract from the Ouarmes region contains the largest amount of polyphenols estimated at 72.86 mg EAG/g and also contains the largest amount of flavonoids estimated at 4.095 mg EQ/g, compared to these results with the international standards, which estimated polyphenols between 123-441 mg EAG/100 g. The minerals were quantitatively estimated by volumetric calibration and multiscale visible spectroscopy. The results showed that the highest value was reached for magnesium in the Ouarmes region , which was estimated at 81.15 mg/100 g for the pulp and peels of potato tubers.

INTRODUCTION

One of the distinctive plants of the family is potatoes, which have become the staple food in many regions of the world and are ranked fourth after wheat, corn, and rice. They are also a strategic commodity, as they play an important role in food security. It is one of the main crops that enter many food industries, and from a health point of view, it gives a large amount of energy more than other crops with high nutritional value. The potato is one of the important crops in Algeria, as it occupied an area of 163 thousand hectares in 2018 distributed over two seasons per year, and the Oued Souf region is one of the most important desert areas producing the potato crop in Algeria; it topped in 2018 with 36,2 thousand hectares.

Due to the recent interest in the quality of food products and food safety, the demand for foods of organic origin with natural nutrients has increased, which led researchers to pay more attention to studying the impact of adding some plant extracts and animal waste on the chemical components of potatoes and thus on their quality and, from it, on production. Therefore, through our research, we wanted to study the impact of chemical fertilizers (natural and artificial) on the potato tuber components of phenolic and mineral compounds.

MATERIAL and METHODS

1- Method of extracting phenolic compounds from the potato *plant Solanum tuberosum L*:

We take a weight of 50 g of potato pulp powder and soak it in a volume of 250 ml of petroleum ether with shaking for h 2 and then leave it for h 24 at laboratory temperature, add to the powder after filtration and drying 150 ml of ethanol (80%) , after shaking leave h 24, then we do the filtration process, and to get better separation and purity we repeat the extraction process using ethanol at least twice.

The extracts are then placed in the electric oven at a temperature not exceeding 60 °C for the purpose of concentrating the extract until dry.

These extracts are then weighed to obtain the extraction yield, which summarizes the most important stages of the extraction of phenolic compounds by the soak method for the Al-Trifaoui and Ouarmes regions.

2- Quantitative and qualitative estimation of polyphenols :

2.1 Determination of total polyphenol content(TPC) :

Total phenolic content of each methanol extracts was determined with the Folin–Ciocalteu’s reagent. The absorbance of the mixture obtained is directly measured by UV-visible spectrophotometer at **765 nm** was calculated. The solutions prepared for the samples are treated with different concentrations with the same treatment as the gallic acid. After obtaining the optical absorption values of these solutions, we use the standard curve of gallic acid .

2.2. Determination of total flavonoids (FVT)

In the quantitative estimation of flavonoids, quercin is used as a reference flavonoid. This method depends on the ability to form the yellow complex between AlCl₃ aluminum trichloride with the hydroxyl (OH) group on the gasoline rings of flavonoids. To plot its reference curve, we read the absorbance intensity of each methanolic extract at wavelength $\lambda_{max} = 420 \text{ nm}$. In the same way as the treated parameters of the studied extracts, and then we read the absorption of the different concentrations .

RESULTS and DISCUSSIONS

1- Extraction yield for polyphenol

- Ph.pt The phenolic extract of potato pulp for the Al-Trifaoui region .
- Ph.pet The phenolic extract of potato peels for the Al-Trifaoui region .
- Ph.po The phenolic extract of potato pulp for the Ouarmes region .
- Ph.peo The phenolic extract of potato peels for the Ouarmes region .

Sample	Ph.peo	Ph.po	Ph.pet	Ph.pt
Initial dry matter mass (g)	10	50	5	50
Extract mass (g)	0.0603	1.2107	0.1536	1.1566
yield (%)	0.603	2.4214	3.072	2.3132

2- Quantitative study of phenolic extracts:

2.1. Quantitative estimation of phenols using UV-Visible :

Sample	Ph.peo	Ph.po	Ph.pet	Ph.pt
Concentration mg/ml	0.8	0.7	2.5	0.3
Absorbance A	0.261	0.118	0.212	0.022
Quantity mg EAG/g	96.08	49.64	24.97	21.60

2.2 Quantitative estimation of flavonoids using UV-Visible :

Sample	Ph.peo	Ph.po	Ph.pet	Ph.pt
Concentration mg/ml	1.2	0.5	1.5	1.5
Absorbance A	0.066	0.061	0.0875	0.081
Quantity mg EQ/g	2.53	5.66	2.6	2.43

3.Antioxidant activity (DPPH test)

Sample	Ph.peo	Ph. po	Ph.pet	Ph.pt	AA
IC₅₀ (mg/ml)	0.08	1	0.55	1.28	0.04

4. Quantitative estimation of minerals present in potato :

Sample	Ph.peo	Ph. po	Ph.pet	Ph.pt
Ca²⁺ (mg /100g)	56.11	38.47	63.81	56.11
Mg²⁺(mg /100g)	111.77	50.53	31.43	116.64
Fe²⁺, Fe³⁺(mg /100g)	2.62	-	0.84	2.64

CONCLUSION

The phenolic extract recorded the largest percentage in the yield is the crust potato extract for the El Trifaoui region, estimated at 3.072%, and the lowest estimated percentage is 0.603% for the phenolic extract for the crust potato of the Ouarmes region.

By estimating the total content of phenols and estimating the total content of flavonoids, it was found that the extract potato for the Ouarmes region contains the largest amount of polyphenols (72.86 mg EAG/g) and also contains the largest amount of flavonoids (4.095 mg EQ/g and we studied the antioxidant efficacy of the extracts using the DPPH test, where we were able to calculate the IC₅₀ for the free radical for the extracts. The obtained IC₅₀ values proved that the activity is best to inhibit DPPH at the phenolic extract of potato peels for the Ouarmes region .

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