Along with wheat and rice, the potato is one of the most important staple foods in the human diet. The potato is high in starch, but is also a good source of protein, fibre, and important minerals. Potatoes are known to naturally contain antioxidant chemicals, phenolics, including the pigments that give them their colour: flavonoids (mostly yellow), carotenoids (orange), and anthocyanins (red/purple/blue). Research has shown that eating antioxidants can counteract the aging process and may help prevent coronary heart disease. Plant genetics, growing conditions, and food processing methods can all affect the amount of antioxidants in potatoes and other crops. Potato varieties that have more pigmented (coloured) flesh and skin are generally higher in antioxidants than less pigmented varieties, and cooler temperatures and longer days have also been linked to increased levels of anthocyanins in red or purple fleshed potatoes. Two different methods can be used to measure the antioxidant activity of a plant sample, the FRAP (ferric reducing antioxidant power) test and the ORAC (oxygen radical absorption capacity) test. The researchers of this study set out to determine the relationship between phenolic content and growing conditions to antioxidant activity in potatoes.

Eleven different varieties of potato were grown in southern Ontario fields over a two year period. Some varieties had red or purple flesh and skin, some had white or yellow flesh and skin, and the rest had red or purple skin but white flesh. Whole potato samples were cut up, flash frozen, and then ground into a fine powder. Each sample was chemically analyzed to determine the amount of total phenolics and the amount of anthocyanins specifically. Using the FRAP and ORAC tests, the antioxidant activity of each sample was also measured directly.

Keywords:
Potato, antioxidants, potato flesh colour, phytochemicals, anthocyanins

Potato varieties with purple or red flesh and skin had significantly higher antioxidant activity than varieties with white or yellow flesh, mostly due to the presence of plant pigments called anthocyanins. Environmental conditions, including average temperature and rainfall, also affected the levels of antioxidants. The research suggests that higher temperatures and higher rainfall contribute to greater antioxidant concentration.
What did the researchers find?
The total amounts of phenolics and anthocyanins differed among the eleven potato varieties, with the red/purple skin and flesh varieties generally having the highest, the white/yellow skin and flesh varieties having the lowest, and the red skin with white flesh varieties being intermediate. The more pigmented varieties also had higher rates of antioxidant activity. The researchers also found that the antioxidant activity was closely related to the amount of phenolics and anthocyanins. Antioxidant activity, amount of phenolics, and amount of anthocyanins were all greater in the first year of the study, which had higher rainfall and higher average temperatures.

How can you use this research?
**Potato breeders and growers** can use this research to better understand how to develop and grow potato varieties that are higher in antioxidants.

**Nutritionists and dieticians** can use this research to learn which potato varieties are high in antioxidants and other beneficial plant chemicals.

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