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Purslane: a weed with a potential for human consumption and animal feed

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Introduction

Common purslane *(Portulaca oleracea),* is a member of the Portulacaceae family which consists of more than 120 species. It is a persistent annual herbaceous weed being well adapted to warm and moist environments. Common purslane is native to India and the Middle East, but this succulent herb is also cultivated in other parts of the world such as Asia, Europe and Africa, it is used for human consumption, animal feed and for medicinal purposes.

Researchers have regarded purslane as a "weed with nutritive potential". This is because it has been identified as a rich source of bioprotective nutrients such as omega-3 (ω-3) fatty acids which are recommended for a healthy diet i.e. antioxidants, vitamins and amino acids.

FIGURE 1: Purslane growing as a weed

Benefits of Purslane

a) Human nutrition

Many crop producers of high-value crops, including South Africa, still consider purslane as a competitive weed. However, purslane can be used in soups and salads for nutrition.

Common purslane is one of the richest vegetable sources of ω-3 fatty acid. It contains five times more ω-3 fatty acid than spinach, broccoli, avocados and strawberries. It is also an important source of antioxidants, vitamins (A and C), α-tocopherol, ascorbic acid, β-carotene and glutathione. Purslane is also rich in minerals such as potassium, magnesium, calcium and iron.

The human body has the capacity to produce all the fatty acids it needs except for the linoleic acid (LA), which is an omega-6 (ω-6) fatty acid and Alpha-linoleic acid (ALA), which is an ω-3 fatty acid. These two types of fatty acids have to be consumed from the diet, hence are termed "essential fatty acids".

Most diets generally have high concentrations of ω-6 in relation to ω-3 fatty acids leading to a fatty acid imbalance. The desired ratio of ω-6 to ω-3 is 1:1. A lower ratio of ω-6 to ω-3 reduces the risk of chronic diseases (Simopoulos 2002). It is noteworthy that both ω-6 and ω-3 fatty acids are equally important as cell membrane constituents.

The challenge is that mammals cannot interconvert ω-6 to ω-3 fatty acid. Furthermore, sources of ω-3 are relatively expensive for poor communities. These sources include salmon and nuts to mention a few.

Therefore, purslane can be an alternative, inexpensive and easily accessible source of omega-3 fatty acid.

FIGURE 2: Purslane as a salad

b) Animal nutrition

Purslane can be used as an animal feed supplement to improve their growth performance. For example, when purslane was fed as a supplement to Moghani Lambs in Iran, their growth performance and cold carcass weight did not differ to when these lambs were fed with alfalfa.

Dried purslane can also be added to the feed of laying hens to increase egg production and egg weight. When purslane was added to the diet of laying hens, the concentration of ω-3 fatty acids improved. This consequently decreased the ratio of omega-6: omega-3 fatty acids in the yolk. In light of the above benefits, this may suggest the economic advantage of replacing other commonly used supplements with purslane.

FIGURE 3: Purslane as an animal feed

c) Medicinal

Research has shown that purslane has the capacity to improve human health. Polysaccharides in purslane have a wide range of pharmacological effects such as anti-carcinogenic, diuretic, antipyretic, antiseptic and anti-inflammatory effects.

Other benefits of purslane include:

- Assists in weight loss
- Lowers cholesterol levels
- Helps prevent heart attacks and strokes (Uddin et al. 2014)
- Stimulates blood circulation
- Prevents blood and oil cancers
- Prevents development of mental disorders and Autism and ADHD in children
- Treats gastrointestinal disorders
- It improves blood pressure (Esmaillzadeh et al. 2015)

Cultivation of Purslane

Common purslane is an annual plant, well adapted to warm and moist environments. It grows well in soil temperatures of approximately 27°C with adequate nitrogen supply. This weed is very versatile. It can grow in the wild, on wastelands and in crop production fields.

It can either be left to grow voluntarily or involuntarily as it can be planted. Little or no research has been done on Purslane in South Africa. However, research done in the United States using accessions indicated that when planted, it produced fresh yields as high as 70 kg/ha. Some of the accessions used in the above study were Garden Dutch, Greece, Golden E and Golden G.

The advantage with purslane is that it can re-root from the stem after cultivation or seeds can be obtained from the purslane itself. It is self-compatible and produces as many as 240 000 seeds in a single season. Its seeds can be viable for up to 40 years.

Planting date of the crop has no effect on its yield, height or flowering date. Therefore, it can be planted whenever the need arises.

It has two important characteristics, namely drought and salinity tolerance. This enables it to grow in any kind of environment. Purslane has a relatively short life cycle; in favourable conditions this plant completes its life cycle in only 60 days. Purslane can be grown with minimum inputs and can be used as an alternative source of nutrition.

Health concerns

Although this nutritious weed has many benefits, its consumption as a fresh vegetable is limited by the accumulation of large quantities of oxalic acid in various parts of the plant. When purslane was fed exclusively to Nubian goats, serious illnesses were observed such as decreased appetite, loss of weight, weakness of the fore and hind limbs leading to an inability of the goat to stand and move (Obied et al. 2003).

Under high doses of oxalic acids as found in purslane, oxalates combine with micronutrients, such as magnesium and calcium making them unavailable for absorption. Furthermore, when they combine with these minerals, crystal salts are formed. These salts are hazardous to human health as they may cause illnesses such as kidney failure. Moreover, under high doses, oxalic acid becomes highly reactive leading to micro-element deficiency to consumers, even though the Recommended Dietary Allowance (RDA) has been consumed. These nutrients are then excreted. However, it must be noted that these symptoms are due to the daily and abundant dosages of raw purslane used as fodder.

However, techniques have been proposed to reduce oxalic acid concentration in order to benefit from this herb.

Ways of reducing oxalic acid in purslane

Cooking - Reduces oxalate content by 27%.

Pickling – Reduces oxalate content by 66.7%.

Applying ammonium fertiliser – the oxalic acid concentration in purslane leaves and stems decreases with increasing ammonium concentration.

References

Esmaillzadeh A, Zakizadeh E, Faghihimani E, Gohari M, Jazayeri S. 2015. The effect of purslane seeds on glycemic status and lipid profiles of persons with type 2 diabetes: A randomized controlled cross-over clinical trial. *Journal of Research in Medical Sciences*. 20: 47-53.

Obied WA, Mohamoud EN, Mohamed OSA. 2003. *Portulaca oleracea* (purslane): Nutritive composition and clinic-pathological effects on Nubian goats. *Small Ruminant Research* 48: 31-36.

Uddin MK, Juraimi AS, Hossain MS, Un Nahar MA, Ali AE, Rahman MM. 2014. Purslane weed (*Portulaca oleracea*): A Prospective plant source of nutrition, omega-3 fatty acid and antioxidant attributes. *The Scientific World Journal*. Article ID 951019: 1-6. DOI: 10.1155/2015/951019

Simopoulos AP. 2002. The importance of the ratio of omega-6/omega-3 essential fatty acids. *Biomedicine & Pharmacotherapy.* 56: 365-379.

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