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Helianthus Tuberosus L. as a Phytobiotic

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Introduction

The Jerusalem artichoke *Helianthus tuberosus L.* is an erect, rhizomatous perennial herb, up to 3-4m height. Though perennial, it is mainly grown as an annual. It is a highly variable plant: many characteristics, including size (2 to 4m), tuber color (green or violet), stem number and the number of branches per stem depend on genetics and environmental conditions. The stems are generally hairy and branch in their lower part. The root system is fibrous and develops cord-like rhizomes that can reach more than 1m in length. The apical part of the rhizome is swollen and forms a fleshy tuber.

The leaves are opposite or alternate, ovate to lanceolate, toothed, and pubescent on the lower surface and 3-20cm long x 5-8cm broad. The inflorescence is a pseudanthium borne alone or in groups at the end of the stem or on terminal axillary branches. The flower head is 5-11cm in diameter (much smaller than that of the sunflower) and bears many small yellow tubular fertile flowers surrounded by yellow ray sterile flowers, the ligules of which are thought of as petals. The fruit is a hairy containing a mottled black or brown seed, 5Mm length x 2Mm width [1].

Phytobiotics is Plant products have been used for centuries by humans as food and to treat ailments. Natural medicinal products originating from herbs and spices have also been used as feed additives for farm animals in ancient cultures for the same length of time. To differentiate from the plant products used for veterinary purposes (prophylaxis and therapy of diagnosed health problems), phytobiotics were redefined by Windisch & Kroismayr [2] as plant-derived products added to the feed in order to improve performance of agricultural livestock.

Compared with synthetic antibiotics or inorganic chemicals, these plant-derived products have proven to be natural, less toxic, residue free, and are thought to be ideal feed additives in food animal production [3]. With respect to biological origin, formulation, chemical description and purity, phytobiotics comprise a very wide range of substances and four subgroups may be classified:

I. Herbs (product from flowering, non-woody and non-persistent plants),

II. Botanicals (entire or processed parts of a plant, e.g. root, leaves, bark),

III. Essential oils (hydro distilled extracts of volatile plant compounds), and

IV. Oleoresins (extracts based on non-aqueous solvents) [2].

Gibson & Roberfroid [4] defined a prebiotic as a non-digestible food ingredient which beneficially affects the host by selectively stimulating the growth of and/or activating the metabolism of one or a limited number of health-promoting bacteria in the intestinal tract, thus improving the host's microbial balance.

The growth of endogenous microbial population groups such as bifid bacteria and lactobacilli is specifically stimulated and these bacteria species are perceived as beneficial to animal health. The dominant prebiotics are fructo-oligosaccharide products (FOS, oligofructose, insulin) [5,6] gluco-oligosaccharides, stachyose, malto-oligosaccharides, and oligochitosan have also been investigated in broiler chickens [7-10]. Insulin belongs to a class of fructose-based, highly soluble polysaccharides collectively called fructans.

Fructans are the major non-structural carbohydrates in many plant species, particularly in the prevalent and evolutionarily advanced orders of Asterales, Liliales and Poales e.g. chicory, onions, wheat [11]. Fructans are deposited in vacuoles and play an important role as carbohydrate reserves in addition to or as an alternative to starch e.g. in cereals [12], for reviews see [13]. They are also involved in osmo regulation e.g. in flowers: [14] and are believed to function as protectants against drought and cold stress [15]. Great interest is currently focused on fructans because of their potential value in food technology [16].

This review gives evidence that the *Helianthus tuberosus L.* could be good supplementation for poultry diet for many reasons. First, because it has prolific and cheap production. Second, it provides a high percentage of insulin. It is worthy to mention that the extracted insulin from *Helianthus tuberosus L.* will consider as prebiotic. While if the insulin used without

extraction, means supplementing the Jerusalem artichoke completely to the poultry diet, it will consider as a phytobiotic.

It can be suggested that the insulin will increase the numbers of the useful bacteria in the GIT. Therefore, the concentration of the bacteria secondary production, enzymes, will increase. That will increase the probability of diet metabolism, which will motivate the development of histo anatomical structures of the intestine. Lastly, using Jerusalem artichoke will improve the poultry feed conversion ratio which will reflect positively of the other production parameters. These observations, as a whole, result that *Helianthus tuberosus L*. is an economical and useful supplementation can be widely used in poultry farms.

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