Diversity of Unavailable Polysaccharides and Dietary Fiber in Domesticated Nopalito and Cactus Pear Fruit (Opuntia spp.)

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The aim of this study was to quantify mucilages, pectins, hemicelluloses, and cellulose of nopalitos (edible, as vegetable, young cladodes of flat-stemmed spiny cacti) of most consumed Mexican cultivars, and sweet and acid cactus pear fruits of Opuntia spp. The hypothesis is that, regardless of their unavailable polysaccharides diversity, nopalitos and cactus pear fruits are rich sources of soluble and insoluble dietary fiber. Twelve cultivars of Opuntia spp. were used. Nopalitos had a significant variation in structural polysaccharides among the cultivars: mucilages (from 3.8 to 8.6% dry matter (DM)) averaged near a half of pectins content (from 6.1 to 14.2% DM) and tightly bound hemicelluloses (from 2.2 to 4.7% DM), which were the less abundant polysaccharides, amounted 50% of the loosely bound hemicelluloses (from 4.3 to 10.7% DM). Acid fruits (or xoconostle) had significantly higher unavailable polysaccharides content than sweet fruit, and contain similar proportions than nopalitos. Unavailable polysaccharides represent a high proportion of dry tissues of nopalitos and cactus pear fruits, composition of both of these soluble and insoluble polysaccharides (total dietary fiber) widely vary among cultivars without an evident pattern. Nopalitos and cactus pear fruit can be considered an excellent source of dietary fiber.

1. Introduction. – Plant cell-wall polysaccharides such as pectins, hemicelluloses, cellulose, and mucilage (unavailable carbohydrate), together with lignin, are the most abundant constituents of dietary fiber. Chemical composition, location in the cell wall, and solubility of each of these macromolecules are criteria to classify them as part of soluble or insoluble dietary fiber [1]. Dietary fiber affects both human and animal physiology, and its effects depend on the type, source, and amount of fiber consumed [2]. It has been reported that the soluble fibers (including pectins, mucilages, and some kind of hemicelluloses, i.e., those loosely bound to cellulose) have hypolipidemic, hypoglycaemic, and hypocholesterolemic properties, can increase the viscosity of gastric juice in stomach, modify the absorption of nutrients, and have also been used to treat obesity [2][3]. The biological effects of insoluble fibers (including cellulose and hemicelluloses tightly bound to cellulose) in humans have been also documented, these