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Enzyme Overview

A Closer Look at Mannanase

Mannannases are enzymes that are responsible for breaking down the mannan portion of the hemicellulose structures found in plant cell walls.

Mannans are members of the hemicellulose family of NSPs. Mannans exist in the form of linear mannan, glucomannan, galactomannan, and galactoglucomannan. Mannans function as structural components in plant cell walls by binding cellulose. They also provide storage reserves of Non-Starch Carbohydrates in the cell walls and vacuoles of various plant tissues. Similar to other NSPs, monogastric animals possess no endogenous enzymes capable of digesting mannans.

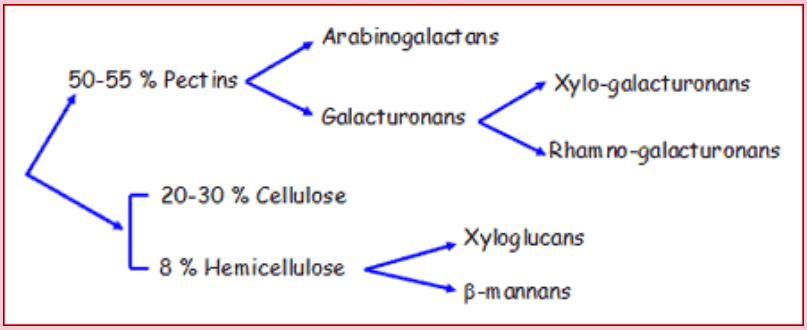
Mannans are more highly concentrated in oilseeds than in grains. For instance, of the 9.9% total NSPs present in corn, only about 3% is made up of mannans.

NSP breakdown in elementary sugars (% DM)

	Corn	Barley	Wheat	Rye
NSP	9.9	18.7	11.9	15.3
β-glucans	0.1	4.2	0.8	1.6
Cellulose	2.2	4.3	2.0	1.6
Mannans	0.3	0.4	0.3	0.5

Bach-Knudsen, Knud Erik, 1997. Carbohydrate and lignin content of plant materials used in animal feeding. Anim. Feed Sci. Tech. 67: 319 - 338.

Whereas, they represent approximately 8% of the total NSPs present in soybean meal.



NSP present in soybean meal (240g/kg).
Brillouet & Carré, 1983; Bach-Knudsen, 1997; Huisman et al., 1998.

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A Closer Look at Mannanase (cont'd)

However, even in oilseeds, mannans do not account for nearly as large a percentage of the total NSPs as do pectins or cellulose. Nonetheless, mannanase enzymes have potential for improving oilseed digestibility, particularly when fed in conjunction with enzymes that express pectinase, cellulose or α-galactosidase activity.

Mannanase enzymes primarily exist in the form of β-mannanase. This enzyme is responsible for cleaving β-1,4 linkages of mannan to release the sugar mannose. However, similar to other NSP structures, mannans have diverse and variable side chain structures comprised of β-1,4 linked mannosides, 1,4-β-glucopyranose, and α-galactose. Thus, for β-mannanase to function more efficiently, the presence of β-mannosidase, β-glucosidase and α-galactosidase are required. As such, carbohydrase products which express multiple mannanase activities, as well as α-galactosidase, should have a higher potential for degrading mannans and improving the digestibility of oilseeds.

One Point Royal / 4400 North Point Parkway / Suite 275
Alpharetta, GA 30022
USA - Tel: 678-339-1500 or 800-727-1019 / Fax: 678-339-1600