

ACTAZIN™

Kiwifruit Ingredient for Digestive Health

The composition of the gut microflora has been found to play important roles in human health and disease. Some plant components, particularly dietary fibers, which are slow or non-digestible by humans, are called prebiotics because they are selectively fermented by gut bacteria resulting in specific changes in the composition and/or activity of the intestinal microbiota, thus conferring benefit(s) upon the host's health.

Kiwifruit have been found to enhance gut health by easing constipation, promoting laxation and modulating colonic microbiota. They represent an important source of dietary fiber and provide a prebiotic benefit for both indigenous microbiota and probiotics, promoting adhesion to intestinal epithelial cells and subsequent colonization. Some dietary fiber is resistant to digestion in the upper digestive tract and can reach the colon largely intact, where it is broken down by microbial glycosidases to liberate oligo- and mono-saccharides, which are further metabolized by the microbiota ultimately resulting in a mixture of organic acids, including short-chain fatty acids (SCFAs) that are a major source of metabolic fuel to the colon [1].

Protein, predominantly in the form of the proteolytic enzyme actinidin, is a minor but significant component of kiwifruit. Actinidin belongs to the cysteine protease family and shows partial sequence homology with papain

and bromelain. It catalyzes the hydrolysis of peptide bonds. *In vitro* studies suggest that actinidin enhances protein digestion in the stomach and the small intestine [2, 3].

Experimental data indicate that actinidin could hydrolyze collagen and fibrinogen perfectly at neutral and mild basic pH, while it could digest pure α -casein and major subunits of micellar casein especially in acidic pH [4]. Scientists say that consuming actinidin may reduce the feeling of being overfull after a protein meal, increase the rate of protein absorption in the small intestine and allow faster and more complete digestion of food proteins.

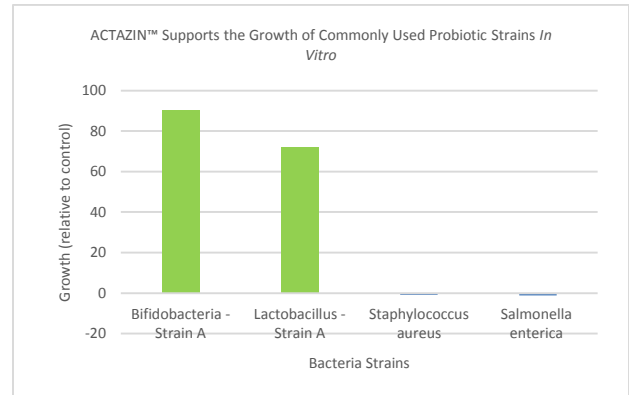
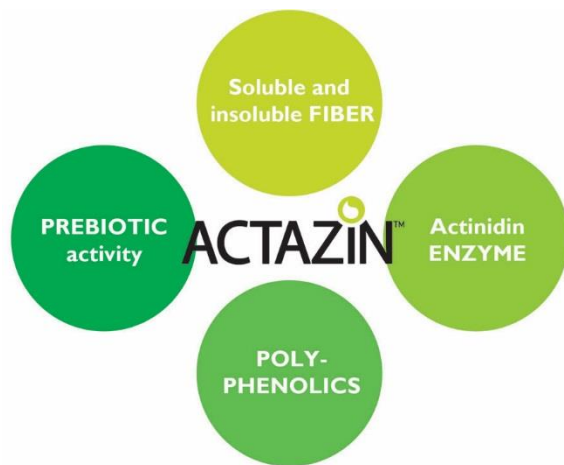
Composition of ACTAZIN™

ACTAZIN™ is pure kiwifruit concentrate, developed by the New Zealand company, Anagenix Ltd, to support better digestive health in people of all ages. It is made with high-quality New Zealand Zespri® kiwifruit. The Zespri® system utilizes ethical business practices, and environmentally friendly methods to grow, cultivate, store and ship the fruit, without genetic engineering (non-GMO).

ACTAZIN™ is a natural, cold-pressed kiwifruit powder concentrate made entirely in New Zealand from green (*Actinidia deliciosa*) kiwifruit. The kiwi pulp is gently processed into a seedless, skinless puree. The puree is then carefully dried and finely milled. The proprietary cold processing and drying techniques used to produce ACTAZIN™ ensure that the high levels of key nutrients and bioactives are retained (Figure below).

The active components in ACTAZIN™ include soluble and insoluble fiber, polyphenolics, and the proteolytic enzyme, actinidin, unique to

kiwifruit. ACTAZIN™ also exhibits prebiotic activity and contains only sugars naturally found in kiwifruit; free of added sugars.



microbial growth conditions for 48 h, simulating *in situ* colonic fermentation. This mixed fermentation model showed an increase in butyrate production, suggesting one or more of the components in ACTAZIN™ is being utilized as an energy source by the intestinal microorganisms.

Efficacy

Pre-clinical studies

Several *in vitro* assessments were carried out to investigate the efficacy of ACTAZIN™. In one such study, different bacterial strains (including species of *Bifidobacteria* and *Lactobacillus*, as well as specific strains of *Escherichia coli*, *Staphylococcus aureus* and *Salmonella enterica*), were incubated in the presence of ACTAZIN™. Results showed that ACTAZIN™ acts as a prebiotic, supporting the growth of *Bifidobacteria* and *Lactobacillus* species (graph to right). It did not promote the growth of pathogenic bacteria versus the control.

In another *in vitro* study, different substrates (digested ACTAZIN™, specific probiotic strains of *Lactobacillus*, digested ACTAZIN™ in combination with *Lactobacillus*, and control) and human fecal inoculum (from healthy donors) were added to a fermentation medium and allowed to ferment under anaerobic

Clinical studies

Several biological activities of kiwifruit have been scientifically documented. The efficacy of ACTAZIN™ has been clinically proven by a randomized, double-blind, placebo-controlled, crossover study using two dosages of ACTAZIN™ administered to healthy and functionally constipated individuals (n = 28; both females and males; aged 23–56 years). At a dose of 2400 mg daily, ACTAZIN™ showed a statistically significant increase in the number of daily bowel movements in the healthy cohort (10.2% increase versus washout).

A lower dose of 600 mg also produced a numerical increase in daily / weekly bowel movements (equivalent to the increase in bowel movements produced by the high dose) in the entire group that just missed statistical significance (P < 0.06); it was statistically significant in the responder group (P < 0.005). While the number of stools increased in all

supplemented groups, their form was not adversely affected (i.e. ACTAZIN™ did not induce looser stool form). This study demonstrated that ACTAZIN™ produced clinically meaningful increases in bowel movements in healthy individuals [5].

Importantly, each dose of ACTAZIN™ was safe and well tolerated, as judged by evaluation of standard biomarkers in the blood along with questionnaires. With regard to abdominal pain, bloating, use of laxatives, manual maneuvers, and incomplete evacuation, there were no differences reported by the subjects when taking ACTAZIN™ compared to when they were taking placebo. Throughout the study, no serious adverse events were reported. There was no impact on quality of life parameters.

Safety

ACTAZIN™ is a high-quality, food-grade ingredient that has been Non-GMO Project verified. ACTAZIN™ is made from kiwifruit, which is a long-established human food. The kiwifruit used to make ACTAZIN™ powder concentrate are supplied by Zespri® New Zealand, who have stringent safety, compliance and control systems in place with their growers to ensure the highest quality standards. No harmful solvents are used during manufacturing and every batch of ACTAZIN™ is tested to assure the quality and safety of the product. The ingredient is gluten-free, free of preservatives, and certified kosher and halal.



A daily dose of ACTAZIN™ is safe for people of all ages, including women who are pregnant or breastfeeding. ACTAZIN™ should not be taken in case of known hypersensitivity or allergy to kiwifruit, latex, birch pollen or other related substances.

Applications and dosage

Species of *Lactobacillus* and *Bifidobacteria* are also commonly included in probiotic foods and supplements. So if ACTAZIN™ is included as an ingredient, probiotic effects may be enhanced. ACTAZIN™ contains the kiwifruit enzyme actinidin, which is known to have a positive effect on the digestion of protein. ACTAZIN™ also includes multiple polyphenolic compounds contributing to its prebiotic effects and providing antioxidant support. ACTAZIN™ is a unique and efficacious enhancement to antioxidant formulations. It is an ideal “green” food.

As a dietary supplement, ACTAZIN™ can be easily formulated in capsules and tablets, alone or in combination with other active ingredients. It can also be a beneficial addition to functional food formulations.

Recommended dosage: 600–2400 mg daily. To alleviate digestive discomfort, ACTAZIN™ can be taken up to 2400 mg/day until discomfort subsides. For ongoing gut health, maintenance and care, 600 mg/day can be taken, providing nutrients on a consistent basis to help support a healthy gut environment.

As a prebiotic in a synbiotic combination with probiotic bacteria, the recommended dose is 25 mg/1 billion cfu of bacteria. In a formulation of > 10 billion cfu of probiotic bacteria, a minimum dose of 250 mg of ACTAZIN is required.

References

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