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Vegelite Protein Powder - A Great-Tasting Blend of Rice and Pea Proteins for Vegetarians, Vegans or Those Intolerant to Dairy Products

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ABSTRACT

Vegelite Protein powder, A great-tasting blend of rice and pea proteins for vegetarians, vegans, or those intolerant to dairy products. A blend of pea and rice proteins designed to help to meet protein needs. Vegan Protein can promote post-workout recovery, help maintain lean muscle mass, and support immune function in people sensitive to dairy or those following a vegetarian or vegan diet. Pea protein, derived from yellow peas, is high in arginine, an amino acid that helps repair muscles by aiding in the production of muscle-building creatine. This review summarizes the current available scientific literature regarding the effect of Vegelite Protein powder - A great-tasting blend of rice and pea proteins for vegetarians, vegans, or those intolerant to dairy products.

Keywords: Vegelite Protein powder, tasting blend of rice and pea proteins, vegetarians, vegans and intolerant to dairy products.

INTRODUCTION

Pea proteins are becoming a viable alternative to soy protein because of techno-functional and nutritive characteristics (1), which can be as good as those of soybeans. Furthermore, pea seed have a lower content of anti-nutritive components, such as proteinase inhibitors and phytic acid (2) and caused less frequent allergic reactions in humans than soybean (3). In addition, they also contain good quality starch and fibers.The most promising alternative to soy protein products are pea protein isolates. As in the case of soy protein isolates, techno-functional properties including solubility, emulsifying, foaming and gelling properties of pea isolates are well documented (4-10). Pea seeds contain about 22-23% proteins. The majority of pea proteins are globulins and albumins, which represent about 80% of total seed protein content. Albumins represent 18-25% and globulins 55-65% of total proteins (21). All globulins and some of albumins are storage proteins, which are used as nitrogen sources for the new embryos after seed germination (22).

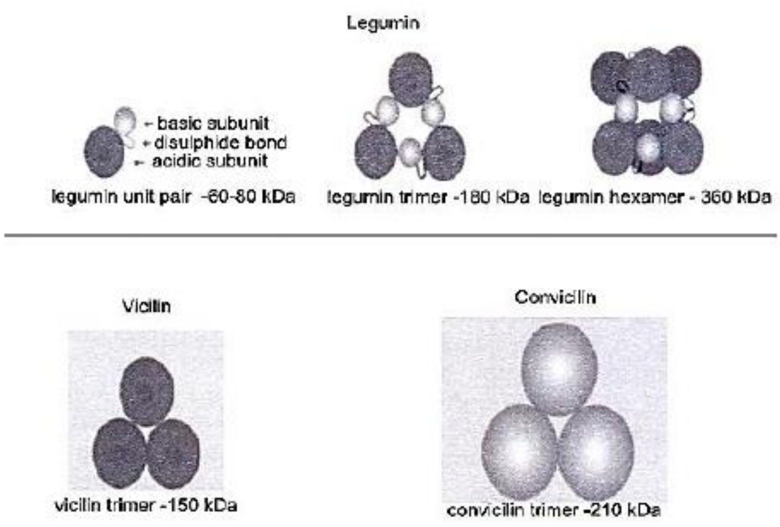

Figure 1. Molecular forms of legumin, vicilin and convicilin (22)

Major pea storage proteins, legumin, vicilin and convicilin are globulins and represent 65-85% of total proteins (23). According to sedimentation properties these proteins are classified into two fractions, 7S (vicilin, convicilin) and 11S fraction (legumin). Molecular forms of the three major proteins are presented in Figure 1.

Legumin is a protein with compact quaternary structure stabilized via disulphide, electrostatic and hydrophobic interactions. It is a hexamer with a molecular weight (Mw) ~320 to 380 kDa and with beta-sheet-rich structure (24). The mature proteins consist of six subunit pairs that interact non-covalently. Each of these subunit pairs consists of an acidic subunit of ~40 kDa and a basic subunit of ~20 kDa, linked by a single disulphide bond (25). As there are a number of legumin precursors originating from several gene families, different legumin polypeptides have been identified, e.g., 4-5 acidic (α) and 5-6 basic (β) polypeptides.

The sizes of these polypeptides range from 38 to 40 kDa for the acidic polypeptides with the isoelectric point (pI) 4.5-5.8, and from 19 to 22 kDa for the basic polypeptides with the pIs of up to 8.8 (26). According to Gueguen et al. (25), more hydrophobic basic polypeptides are placed in the interior of the legumin molecule, whereas acidic polypeptides are oriented towards the outside of the molecule. Due to its compact quaternary structure, legumin is a heat-stable protein. Thermal transition point of legumin is above 90oC. On the other hand, the quaternary structure of the legumin is more sensitive to pH and salt concentration. Pea legumin is present as a hexamer at the pH 7.0 and high ionic strength (0.1 M), but dissociates at, e.g., the pH 3.35 and 10.0, and, depending on the ionic strength, into a mixture of trimers, dimers, and monomers. Acidic conditions seem to be more drastic than alkaline ones, thus the native legumin is completely dissociated to monomers at the pH 2.4 (25).As a food protein, legumin is recognized for its sulphur containing amino acid residues. It has been reported to contain approximately two cysteine and three methionine residues per 60-kDa subunit (27).

Vicilin

Vicilin is a trimeric protein of 150-170 kDa that lacks cysteine residues and hence cannot form disulphide bonds (27). The composition of vacilin subunits varies mostly because of post-translation processing. Mainly, vicilin consists of ~47 kDa, ~50 kDa, ~34 kDa and ~30 kDa subunits (28). Pea vicilin heterogeneity is more complex than the heterogeneity of legumin. Its heterogeneity derives from a combination of factors, including production of vicilin polypeptides from several small gene families encoding different primary sequences, differential proteolytic processing, and differential glycosylation (29). Thermal denaturation temperature of vicilin depends on ionic strength conditions. At low ionic strength conditions (μ =0.08) the thermal denaturation temperature is 71.7, whereas at higher (μ =0.5), it is 82.7oC (30).

Convicilin

A third major storage protein, distinct from legumin and vicilin, is convicilin. This protein has a distinctively different amino acid profile and unlike the 7S vicilin, contains very little carbohydrate and has a subunit molecular weight of 71,000 Da. The molecular weight of its native form is 290,000 Da including an N-terminal extension (8).

Convicilin is not known to undergo any post-/co-translational modifications other than removal of the signal peptide, and it is not glycosylated. In opposite to vicilin, the residues of sulphur-amino acids are presented in primary structure of convicilin. However, O'Kane et al. denoted this protein as α-subunits of vicilin. According to these authors, convicilin has an extensive homology with vicilin along the core of its protein, yet is distinguished by the presence of a highly charged, hydrophilic N-terminal extension region consisting of 122 or 166 residues. The homologies of convicilin and vicilin are shown schematically in Figure 2.

Pea protein content and composition vary among genotypes. Also, these parameters are influenced by environmental factors . As a result of genotype and environment- induced variations, the ratio of vicilin to legumin varies and may range from 0.5 to 1.7, with a mean of 1.1. Barac et al (6) investigated protein composition of six different genotypes and showed that the ratio of the sum of vicilin and convicilin to legumin content ranged from 1.30 to 1.78. The differences in content, composition and structure between vicilin and legumin are exhibited in both nutritional and techno-functional properties. Legumin contains more sulphur containing amino acids than vicilin per unit of protein (27), and its more available fraction from a nutritional point.

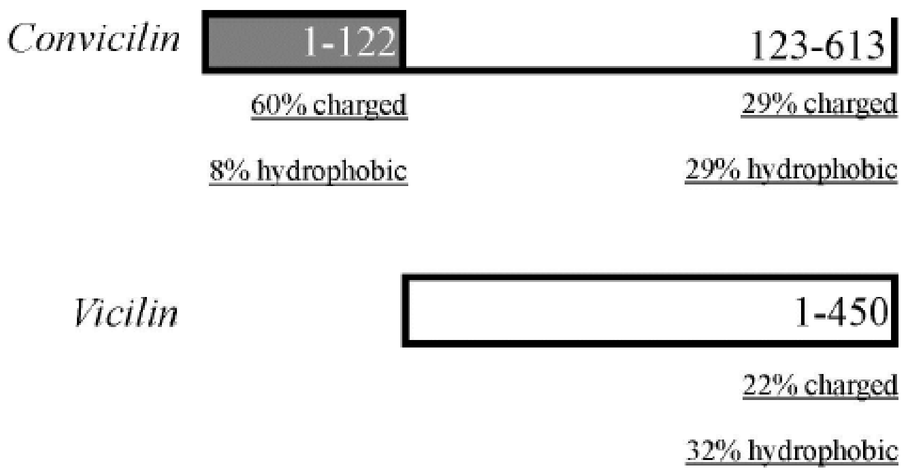

Figure 2. Schematic diagram of the highly charged N-terminal extension region (residues 1-122) present in convicilin molecules

Vegelite Protein powder , A great-tasting blend of rice and pea proteins for vegetarians, vegans, or those intolerant to dairy products. A blend of pea and rice proteins designed to help to meet protein needs.

Composition of vegelite protein powder

- Pea Protein Isolate: 22 grms
- Rice Protein 2 grams
- Iron -1 mg
- Sodium-100 mg
- Potassium-80 mg

- Calcium-80 mg
- Maize Extract-1 grm
- Sugar- 1 grm

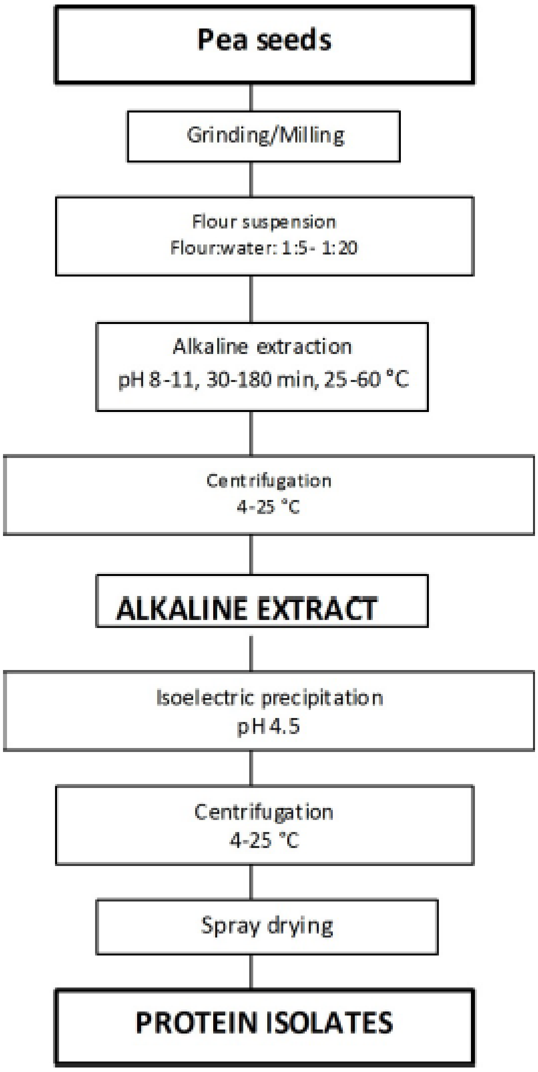

Figure 3. Schematic diagram of alkaline extraction and isoelectric precipitation process for production of pea protein isolates (8)

Supplement Facts

Presentation: protein powder

Usage: A blend of pea and rice proteins designed to help to meet protein needs. Vegan Protein can promote post-workout recovery, help maintain lean muscle mass, and support immune function in people sensitive to dairy or those following a vegetarian or vegan diet.

Pea protein, derived from yellow peas, is high in arginine, an amino acid that helps repair muscles by aiding in the production of muscle-building creatine.

Contra-indications: Product is contra-indicated in persons with Known hypersensitivity to any component of the product hypersensitivity to any component of the product.

a) Suggested Use:Mix 1 level scoop of powder with at least 10 ounces of water, juice, or preferred beverage daily or as recommended by your health-care or performance professional.

b) Warnings:

c) *ALLERGYWARNING*

This product is contraindicated in an individual with a history of hypersensitivity to any of its ingredients.

PREGNANCY

If pregnant, consult your health-care practitioner before using this product.

INTERACTIONS

There are no known adverse interactions or contraindications at publication date

d) FAQs

e) *Why is the powder fluffy?*

Our Vegelite Protein is fluffier because we don't add lecithin. Lecithin makes powders more moist, less messy, and easier to mix, but doesn't add any nutrients. This fluffier consistency also makes Vegelite Protein ideal for making brownies and other snacks.

What's the breakdown of pea and rice protein in this product?

It's about 95 percent pea protein and 5 percent rice protein.

Storage: Store in a cool, dry and dark place.

CONCLUSION

Vegelite Protein powder,A great-tasting blend of rice and pea proteins for vegetarians, vegans, or those intolerant to dairy products.A blend of pea and rice proteins designed to help to meet protein needs. Vegan Protein can promote post-workout recovery, help maintain lean muscle mass, and support immune function in people sensitive to dairy or those following a vegetarian or vegan diet. Pea protein, derived from yellow peas, is high in arginine, an amino acid that helps repair muscles by aiding in the production of muscle-building creatine.

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CONFLICTS OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

REFERENCES

1. O'Kane, F. E.; Vereijken, J. M.; Gruppen, H.: Van Boekel M. A. J. S. Gelation behavior of protein isolates extracted from 5 cultivars of Pisum sativum L. *J. Food Sci.* 2005, *70*, 132-137.

2. Gwiazda, S.; Rutkowski, A.; Kocoń, J. Some functional properties of pea and soy bean protein preparations. *Nahrung* 1979, *23*, 681-686.

3. San Ireneo, M.; Ibáñez Sandín, M.D; Fernández-Caldas, E.; Marañón Lizana, F.: Rosales Fletes, M.J., Laso Borrego, M.T. Specific IgE levels to Cicer arietinum (Chick pea) in tolerant and nontolerant children: evaluation of boiled and raw extracts. *Int. Arch. Allergy Imm.* 2000, *121*, 137-143.

4. Karaca, A.C.; Low N.; Nickerson, M. Emulsifying properties of chickpea, faba bean, lentil and pea proteins produced by isoelectric precipitation and salt extraction. *Food Res Int.* 2011, *44*, 2742-2750.

5. Aluko, R.E.; Mofolasayo, O.A.; Watts, B.M. Emulsifying and foaming properties of commercial yellow pea (*Pisum sativum* L.) seed flours. *J. Agric. Food Chem.* 2009, *57*, 9793-9800.

6. Barac, M.; Cabrilo, S.; Pesic, M., Stanojevic, S.; Ristic, N. Profile and functional properties of seed proteins from six pea (Pisum sativum) genotypes. *Int. J. Mol. Sci.* 2010, *11*, 4973-4990.

7. Boye, J.I.; Aksay, S.; Roufik, S.; Ribéreau, S.; Mondor, M.; Farnworth, E.; Rajamohamed, S.H. Comparison of the functional properties of pea, chickpea and lentil protein concentrates processed using ultrafiltration and isoelectric precipitation techniques. *Food Res. Int.* 2010a, *43*, 537-546.

8. Boye, J.; Zare, F.; Pletch, A. Pulse proteins: processing, characterization, functional properties and applications in food and feed. *Food Res Int*. 2010b, *43*, 414-431.

9. Adebiyi, A.P.; Aluko, R.E. Functional properties of protein fractions obtained from commercial yellow field pea (Pisum sativum L.) seed protein isolate. *Food Chem*. 2011, *128*, 902-908.

10. Taherian, A.R.; Mondor, M.; Labranche, J.; Drolet, H.; Ippersiel, D.; Lamarche, F. Comparative study of functional properties of commercial and membrane processed yellow pea protein isolates. *Food Res. Int.* 2011, *44*, 2505-2514.

11. Fernandez-Quintela A.; Macarulla, M.T.; Del Barrio, A.S.; Martinez, J.A. Composition and functional properties of protein isolates obtained from commercial legumes grown in northern Spain. *Plant Foods Hum. Nutr.* 1997, *51*, 331-342.

12. Sun, X.D.; Arntfield, S.D. Gelation properties of salt-extractedpea protein induced by heat treatment. *Food Res. Int.* 2010, *43*, 509-515.

13. Sumner, A.K.; Nielsen M.A.; Youngs, C.G. Production and evaluation of pea protein isolate. *J Food Sci.* 1981, *46*, 364-372.

14. Sosulski, F.W.; McCurdy, A.R. Functionality of flours, protein fractions and isolates from field peas and bean. *J. Food Sci.* 1987, *52*, 1010-1014.

15. Barac, M.B.; Pesic, M.B.; Stanojevic, S.P.; Kostic, A.Z.; Bivolarevic, V. Comparative study of the functional properties of three legume seed isolates: adzuki, pea and soy bean. *J. Food Sci. Technol.* 2014, in press, DOI 10.1007/s13197-014-1298-6.

16. Maninder, K.; Sandhu, K.S.; Singh N. Comparative study of the functional, thermal and pasting properties of flours from different field pea (*Pisum sativum L.*) and pigeon pea (*Cajanus cajan L.*) cultivars. *Food Chem.* 2007, *104*, 259-267.

17. Barac, M.; Cabrilo, S.; Pesic, M.; Stanojevic, S.; Pavlicevic, M.; Macej, O.; Ristic, N. Functional properties of pea (*Pisum sativum, L*) protein isolates modified with chymosin. *Int. J. Mol. Sci*. 2011, *12*, 8372-8387.

18. Periago, M.J.; Vidal, M.L.; Ros, G.; Rincón, F.; Martínez, C.; López, G., Rodrigo, J.; Martínez, I. Influence of enzymatic treatment on the nutritional and functional properties of pea flour. *Food Chem.* 1998, *63*, 71-78.

19. Fuhrmeister, H.; Meuser, F. Impact of processing on functional properties of protein products from wrinkled peas. *J. Food Eng.* 2003, *56*, 119-129.

20. Dua S.; Mahajan, A.; Sandal Gagan, M. Physico-chemical properties of defatted pea seed meal proteins with emphasis on salts and pH. *J. Food Sci. Tech.* 2009, *46*, 251-254.

21. Tsoukala, A.; Papalamprou, E.; Makri, E.; Doxastakis, G.; Braudo, E.E. Adsorption at the air-water interface and emulsification properties of grain legume protein derivatives from pea and broad bean. *Colloids Surf. B* 2006, *53*, 203-208.

22. Tzitzikas, E.N.; Vincken, J.P.; De Groot, J.; Gruppen, H.; Visser, R.G.F. Genetic variation in pea seed globulin composition. *J. Agric. Food Chem.* 2006, *54*, 425-433.

23. Owusu- Ansah, Y. J.; McCurdy S.M. Pea Proteins: A review of chemistry, technology of production, and utilization. *Food Rev. Int.* 1991, *7*, 103-134.

24. Schwenke, K. D.; Henning, T.; Dudek, S.; Dautzenberg, H.; Danilenko, A. N.; Kozhevnikov, G. O.; Braudo, E. E. Limited tryptic hydrolysis of pea legumin: molecular mass and conformational stability of legumin-T. *Int.l J. Biol. Macromol.* 2001, *28*, 175-182.

25. Gueguen, J.C.M.; Barbot J.; Schaeffer F. Dissociation and aggregation of pea legumin induced by pH and ionic strength. *J. Sci. Food Agric.* 1988, *53*, 167-182.

26. Heng, L.; Van Koningsveld, G.A.; Gruppen, H.; Van Boekel, M.A.J.S.; Vincken J.P.; Roozen, J.P.; Voragen, A.G.J. Protein-flavour interactions in relation to development of novel protein foods. *Trends Food Sci. Technol.* 2004, *15*, 217-224.

27. Shewry, P. R.; Napier, J. A.; Tatham, A. S. Seed storage proteins: Structures and biosynthesis. *Plant Cell* 1995, *7*, 945-956.

28. Griga, M;. Horáček, J.; Klenotičová, H. Protein patterns associated with *Pisum sativum* somatic embryogenesis. *Biol. Plantarum* 2007, *51*, 201-211.

29. Casey, R.; Domoney, C. The biochemical genetics of pea seed storage proteins. *Kulturpflanze* 1984, *32*, S99-S108.

30. Kimura, A.; Fukuda, T.; Zhang, M.; Motoyama, S.; Maruyama, N.; Utsumi S. Comparison of physicochemical properties of 7S and 11S globulins from pea, fava bean, cowpea, and French Bean with those of Soybean. French Bean 7S globulin exhibits excellent properties. *J. Agric. Food Chem.* 2008, *56*, 10273-10279.