



# ***PLANT PROTEIN*** **Amino Acid** **Comparison**

## **Amino Acid Composition of Selected Plant Protein Powders**

### **Which plant protein is best for my product?**

Plant protein powders are available from different sources (allergen and non-allergen) and in a range of protein concentrations from 50% to >90%. The more the protein is concentrated, the fewer the presence of other nutrients in the powder. However, this also means there is a greater quantity of amino acids than in powders with lower protein concentrations.

Figures 1A & 1B show the typical amino acid content for various plant protein sources. Due to a dry basis protein concentration >90%, rice, soy and canola protein powders contain the greatest total quantity of amino acids and the least amount of carbs, fat and minerals. On the other hand, sachai inchi and hemp protein contain the least amount of total amino acids (out of the below protein sources), which in addition means they also contain substantial amounts of beneficial minerals, vitamins, fatty acids, etc. Depending on the nutritional goals of the end product, manufacturers can choose the protein powder to best suit their needs and those of their consumers. If you need a pure protein source, then opt for 80-90% protein powders. If you need protein with added benefits (like omega 3) then the 50% protein powders or a combination there of would be ideal.

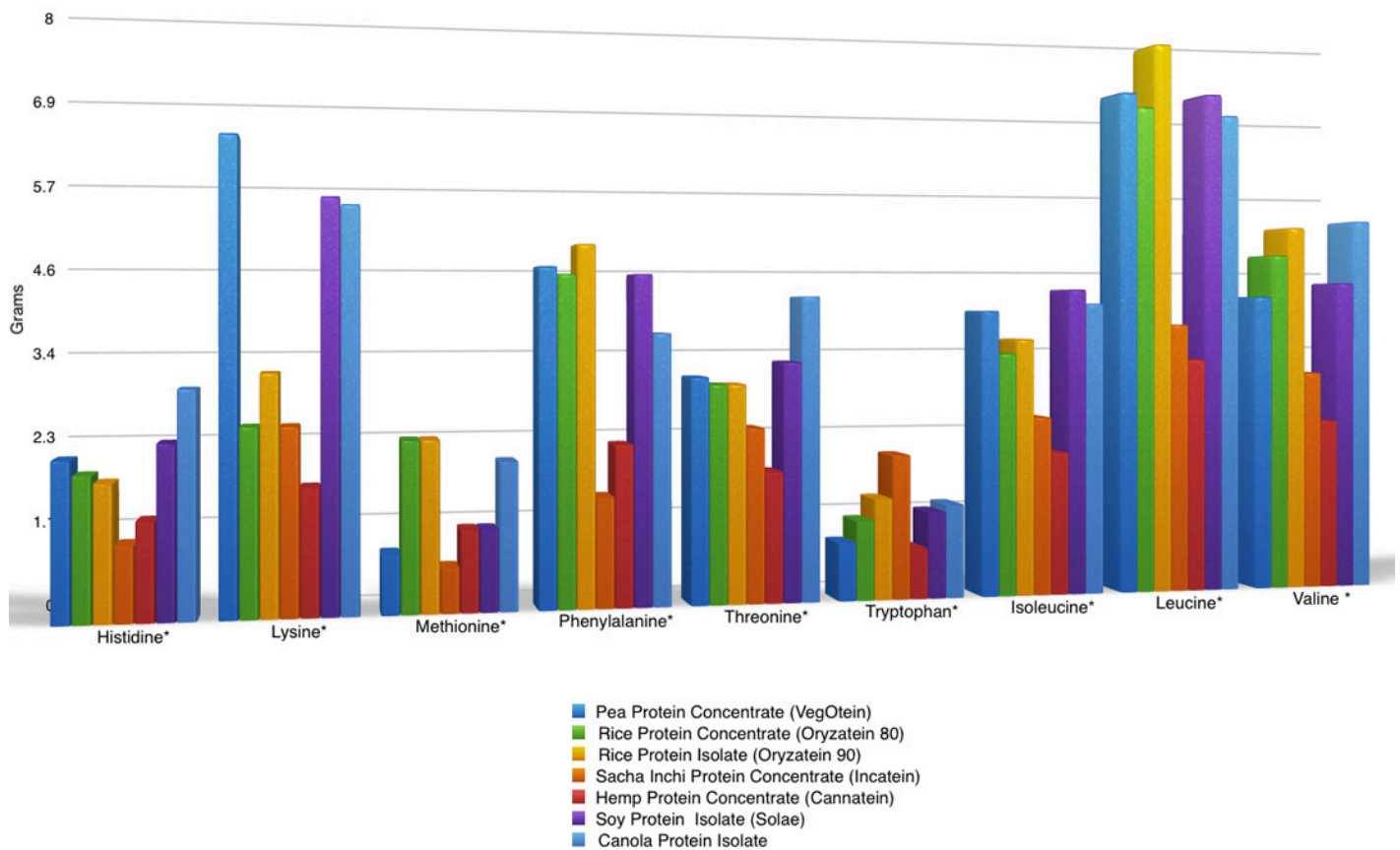
All Axiom Foods' plant proteins are free of all major allergens and additionally gluten-free. They are always non-genetically modified and extracted naturally and without the use of hazardous chemicals.

# Typical Essential Amino Acid Content per 100 grams of Product

## Did you know?

A clinical study showed that leucine in Oryzatein rice protein is absorbed into the body almost 30% faster than the leucine in whey protein. Leucine is the key amino acid for muscle building. This may help to explain why rice protein is as good at whey at building muscle. For more info on this and other studies please visit [AxiomFoods.com/clinicaltrials](https://AxiomFoods.com/clinicaltrials).

Figure 1A



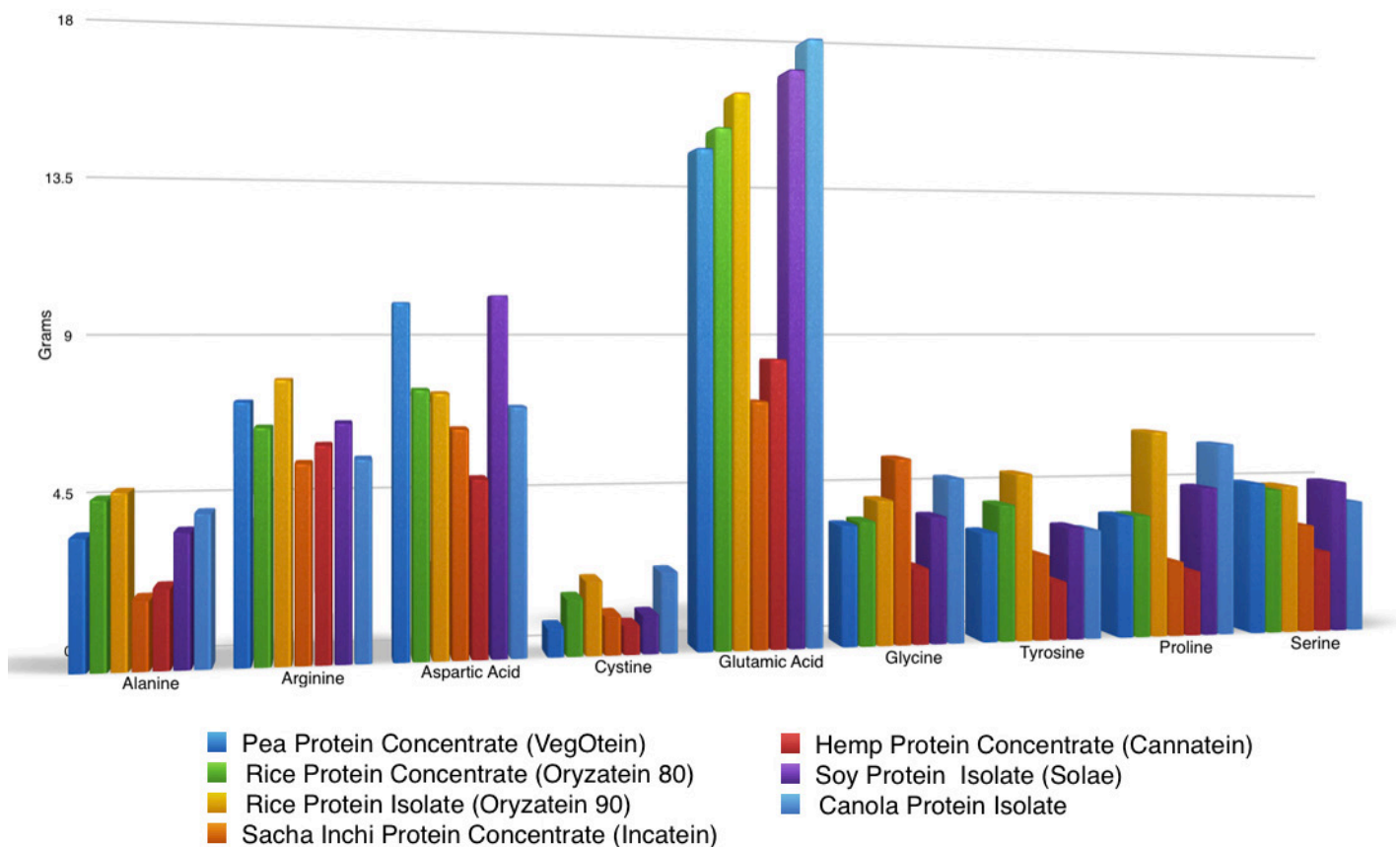


# Typical Non-Essential Amino Acid Content per 100 grams of Product

## Amino Acid Driven Benefits

Certain amino acids may play important roles when formulating for specific health conditions or lifestyles. Branched-chain amino acids (leucine, valine and isoleucine) are key in sport formulas for example, because they promote muscle building, assist with recovery and provide fuel for muscles. Glutamine (made from glutamic acid) may be useful in sport, digestive or clinical formulas as it helps to minimize the breakdown of muscle, helps maintain intestinal function and aids in the immune response. Arginine may be beneficial for men's health, heart health and sport formulas as it may help improve blood flow in arteries, improves athletic performance and may enhance libido. Tryptophan is key for making melatonin, important for sleep and may be useful in aging or relaxation formulas. Assisting with the formation of collagen and muscle tissue, lysine may be key in aging or sport formulas.

Figure 1B





## Typical Essential Amino Acid Proportion per 100 grams Crude Protein (Figure 2 on the next page)

### What is a complete protein?

The textbook definition of a “complete” protein is one that can provide all the essential amino acids, and in the needed proportions, to efficiently support protein synthesis. These are typically animal-derived proteins, such as whey or egg protein. Unfortunately this definition doesn’t take factors such as potential negative health effects into consideration. Although animal-based proteins are seen as more complete than plant-based, they are also considered major allergens and diets revolving around animal protein have also been associated with a myriad of chronic diseases or conditions. Additionally, they are not consumed by millions of vegans & vegetarians.

### How can I achieve a complete protein with plant proteins?

While they provide all 20 amino acids, ALL plant-based proteins (with the exception of soy) are known to be “incomplete” in this context, when compared to animal proteins because they don’t independently provide the ideal proportions of a couple of amino acids. Because of this they are also considered “lower quality” proteins. However, by combining 2 or more complementary sources of plant proteins (like rice + pea protein), the required amino acid levels can be achieved.

AMINO ACIDS	Grain-Based Proteins (e.g. Oryzatein®)	Bean or Legume-Based Proteins (e.g. Vegotein™)
Lysine	Low	High
Cystine	High	Low
Methionine	High	Low

Grains or grain-derived proteins (like Oryzatein®) generally have low lysine levels and high cystine and methionine levels. Bean- or legume-derived proteins are typically low in cystine and methionine but are high in lysine. Therefore, these are complementary proteins.

### Does your product need a complete protein?

This answer actually depends on your target population. If your target market is one that will be relying on your product as a sole source of protein or nutrition (such as

baby formula) then a complete protein is optimal as the amino acids are essential for proper growth and tissue building. Complete proteins are also ideal for consumers with a highly restricted diet (such as one with multiple food allergies) which does not allow for much variety in protein sources.

Alternately, if your product will be marketed to adults (who are not in a growth state) who will use this as an occasional supplement to their diet—“complete proteins” are not required. Complete proteins do not need to be consumed in a single food item or sitting. The body is able to use amino acids from various “incomplete proteins” throughout the day to achieve complete proteins. This is typical of westernized diets which are composed of multiple protein sources daily.

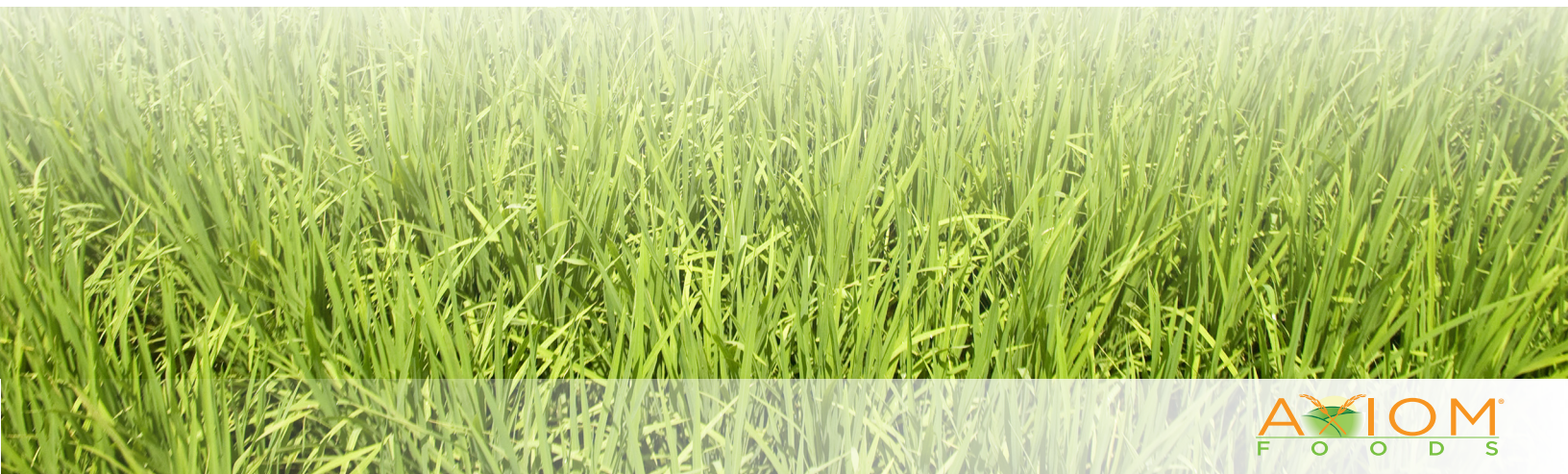
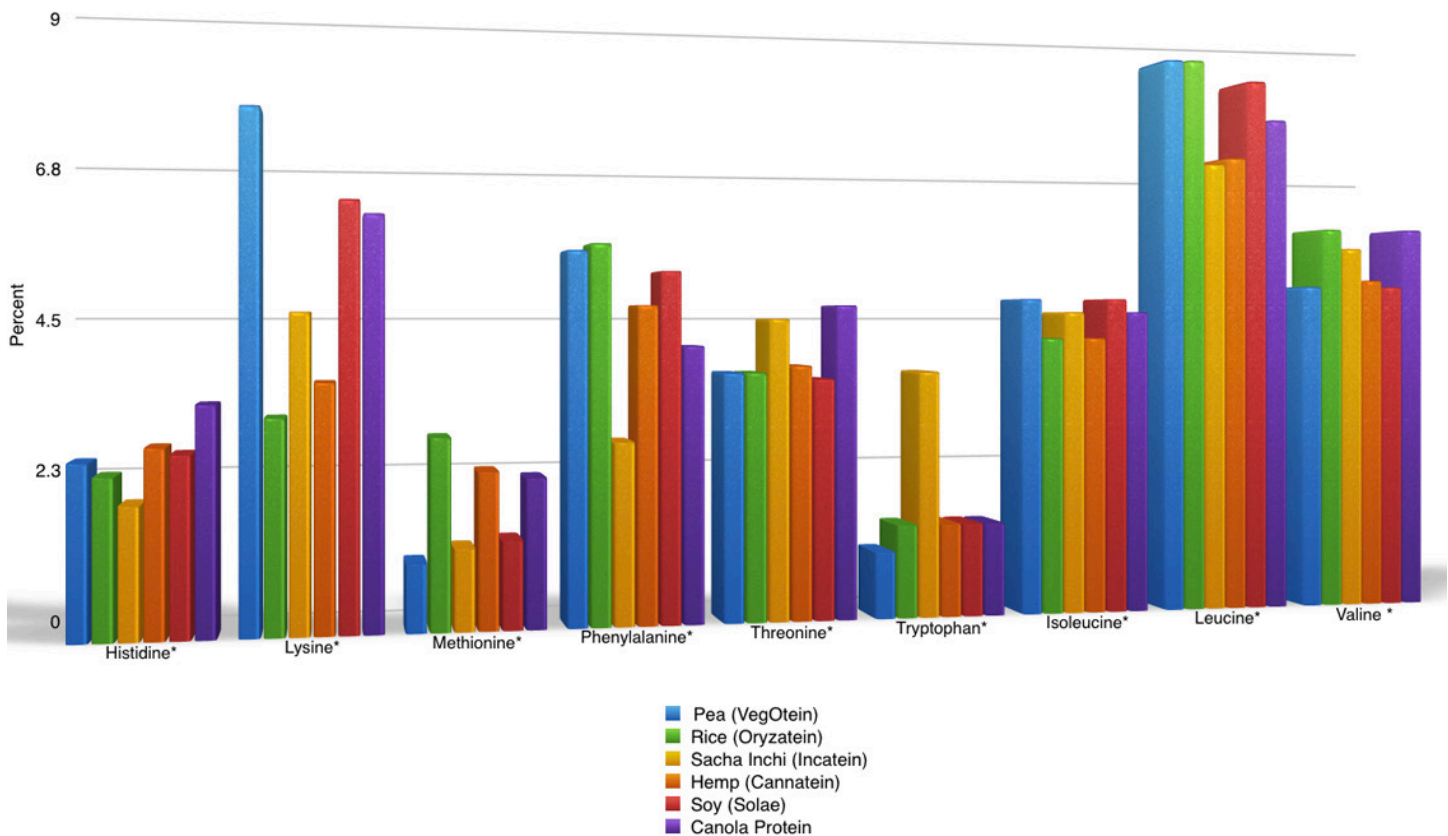
### How are plant proteins high-quality proteins?

Plant proteins can be considered high quality for the nutritional benefits they confer. Unlike animal proteins, diets revolving around plant proteins have been linked to better overall health and less chronic disease. It’s not so much the protein content itself, but what comes “packaged” with the protein. For example, although animal-based proteins do have some beneficial minerals, they always contain pro-inflammatory fatty acids like saturated fat or cholesterol (even if in trace quantities). Plant proteins, on the other hand, don’t contain any saturated fat or cholesterol. The fats they do contain are unsaturated and sometimes even anti-inflammatory (like in Incatein™ Sacha Inchi Protein and Cannatein™ Hemp Protein). Whole plant protein foods are rich sources of vitamins, minerals, fiber and antioxidant phytonutrients known to improve health and increase longevity. Depending on the protein concentration, plant protein powders can retain these nutrients and support health to a similar extent.



# Typical Essential Amino Acid Proportion per 100 grams Crude Protein

Figure 2





# Typical Non-Essential Amino Acid Proportion per 100 grams Crude Protein

Figure 3

