



## Protein Crumbles<sup>®</sup>

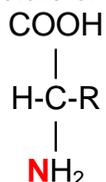
### An organic form of soil nitrogen

**Proteins** are large organic compounds made of amino acids. **Protein Crumbles<sup>®</sup>** is a product of Soil Secrets comprised of the protein portion of specific types of seed selected to represent an ideal ratio of the amino acids providing the highest possible **Protein Digestibility Corrected Amino Acid Score (PDCAAS)**, which is a method of evaluating protein quality based on both the amino acid requirements of humans and their ability to digest the protein. PDCAAS is also how we choose to quantify and qualify protein as a soil amendment. In Protein Crumbles the total protein percentage (by dry weight) is measured at 52.7% which equates to a nitrogen percentage of 8.4%, available in a slow release form. It's slow release because the soil's microbiology must first reduce the protein down to the amino acids before the N can be used by a plant or crop. See attached analysis by Servi-Tech Laboratories dated 1/27/2011. **Unlike common fertilizer products, protein has no salt index and does not contribute salt to the soil.**

Protein Crumbles is registered in New Mexico as a Soil Amendment, because it supports the building of a healthy Soil Food Web. While we are not currently registering this product in New Mexico or any state as a nitrogen fertilizer, while it does have a nitrogen value which can be calculated by using the **Nitrogen Conversion Factor**. This is the factor by which all protein has a nitrogen value contained within a foodstuff or within the protein portion of the microbial biomass found within the 'Soil Food Web'. Within the microbial biomass of soil microbiology there is protein and within that protein there is nitrogen. As this microbiology lives and dies it passes that nitrogen onto the next trophic level of life, while some is excess and is used by plants. We provide Protein Crumbles as a protein calorie used to support the 'Soil Food Web' and we place less emphasis on this product as a source of Nitrogen fertilizer **just for plants**.

**Here's how you make the conversion from protein to nitrogen:** It's called the **Nitrogen Conversion Factor** and it's the method the nitrogen content of a foodstuff is determined and it depends on the amino acid composition of the protein. For example: wheat and most cereals are at 5.8; rice, 5.95; soya, 5.7; most legumes and nuts, 5.3 and milk is 6.38. In mixtures of proteins, where the amino acids are complementing each other for a good **PDCAAS**, the chances of all the essential amino acids being available increases, therefore the factor of 6.25 is used. In the case of a good protein source with a high protein efficiency ratio 'Crude protein' is defined as  $N \times 6.25$ . In the case of Protein Crumbles to convert from 'Crude Protein' to Nitrogen you would use this formula as  $52.7 \div 6.25 = 8.4\%$  Nitrogen. Since most proteins contain 16% nitrogen, you can also use the formula  $.16 \times 52.7$  (crude protein) = 8.43% nitrogen

The generalized structure of alpha amino acids is:



## Biological, Organic and Sustainable Soil Fertility

Since Soil Secrets LLC is more interested in the concept of Biological Soil Management and restoring the Bio-Geo-Chemical process of the Soil Food Web, we are also more interested in protein as a source of amino acids. There is ample evidence that in a natural soil ecosystem where plants are associating with mycorrhizae, some of the nitrogen uptake is happening via the mycorrhizae that are capable of sequestering amino acids without liberating the nitrogen from the amine. There is also evidence that some plants can uptake amino acids even without a mycorrhizal relationship, which can contribute a significant supply of Nitrogen to a plant. See the abstract below to support this claim. When you are utilizing this natural method of protein cycling, amino acid availability and the use of Free-Living Nitrogen Fixing Diazotrophic bacteria, you are not dependent upon the soils Cation Exchange Capacity to dictate how much nitrogen is constantly available to a crop. The CEC of a soil can only hold about 10 X's what the CEC value is, therefore if you have a loam sand with a CEC of 3 the nitrogen holding capacity is limited to 30 pounds per acre, which is not very much.

**We are certain that our Protein Crumbles is the best product for providing amino acids as a nutritional factor for a crop and for the Soil Food Web! Soil Secrets can also provide the Free-Living Nitrogen Fixing Diazotrophic bacteria, to help your soils make more free nitrogen!**

### Research

#### Influx and efflux of amino acids from *Zea mays* L. roots and their implications for Nitrogen nutrition and the rhizosphere

Journal: **Plant and Soil**, 1993

Volume: 155 -156, 87-90

D. L. Jones<sup>1</sup> and P. R. Darrah<sup>1</sup>

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**Abstract** The aim of the study was to investigate the ability of *Zea mays* L. roots to regulate the amount of free amino acids present in the rhizosphere. The active uptake of amino acids was shown to conform to Michaelis-Menten kinetics. Comparison of amino acid-N and NO<sub>3</sub>-N kinetic parameters and soil solution concentrations showed that root uptake of free amino acids from soil may contribute (if available) significantly to a plant's N budget. The influx of amino acids also helps to minimize net C/N losses to the soil, and is therefore important in regulating the size of the rhizosphere microbial population. Experimental data and a computer simulation model of amino acid influx/efflux in a sterile solution culture, showed that roots were capable of re-sorping over 90% of the amino acids previously lost into solution as a result of passive diffusion.

Eurofins Sample Code: 464-2008-08130255

Reporting Date: 08/20/2008  
Entry Date: 08/13/2008Client Sample Code: 8/8/08  
PO Number:  
Client Code: QD0003264**Amino Acid Profile of Protein found in Protein Crumbles****REPORT OF ANALYSIS**

AR-08-QD-068916-01

<b>Test</b>	<b>Result</b>
Tryptophan	0.75 %
Cystine	0.46 %
Methionine	0.48 %
Aspartic Acid	3.97 %
Threonine	1.34 %
Serine	1.87 %
Glutamic Acid	8.36 %
Proline	1.28 %
Glycine	2.26 %
Alanine	1.84 %
Valine	1.43 %
Isoleucine	1.23 %
Leucine	2.31 %
Tyrosine	1.50 %
Phenylalanine	1.57 %
Total Lysine	1.90 %
Histidine	0.99 %
Arginine	5.41 %

Respectfully Submitted,  
Eurofins Scientific Inc.

David Gross, Mgr of Support Svcs.



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Lab No.: 6271		FEED ANALYSIS REPORT		Date Reported: 01/27/2011
<b>Send To:</b> 1809	TEXAS EARTH INC ATTN: JIM BURNETT 2500 LUBBOCK RD P O BOX 407 BROWNFIELD, TX 79316			
<b>Results For:</b> <b>Feedstuff Description:</b> <b>Sample Identification:</b> <b>Date Received:</b>	JIM BURNETT SCREENINGS, GRAIN PROTEIN CRUMBLIES 01/26/2011	 Todd Whatley Laboratory Manager		
<b>Invoice No.:</b>	316302			
Feed Analysis Results		As Received	100% Dry Matter	
Moisture, %	8.0			
Dry Matter, %	92.0			
Crude Protein, %	48.4		52.7	