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Popular Article

Role of Herbal Betaine in Aquaculture

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Abstract

Trend of intensive aquaculture culture strategies negatively affect the health of aquatic organisms through suppressing immunity and increasing susceptibility to infection. Many countries have forbidden the use of certain chemotherapeutics, and also refuse to import aquaculture products treated with antibiotics and chemicals due to their residual and other side effects. Therefore, researchers have intensified efforts to exploit natural products such as herbs and plants in development of alternative dietary supplements that enhance growth performance, health and immune system of cultured organisms instead of chemotherapeutic agents. The use of herbal products belonging to different families in the management practices of aquaculture is gaining momentum, as they are safe, effective, widely available and cost effective to produce fishes free from chemicals.

Herbal Betaine is rich in foods, such as wheat bran, wheat germ, spinach, beets, and whole grains, although exact values will vary with different sources of foods and cooking methods. It is named betaine because it was first isolated from sugar beet molasses. Betaine can alleviate stress. Various stress reactions seriously affect the feeding and growth of aquatic animals, reduce the survival rate and even cause death. The addition of betaine in feed can help to improve the decline of aquatic animals' food intake under disease or stress, maintain nutritional intake and reduce some disease conditions or stress reactions. Betaine helps to resist cold stress below 10 °C, and is an



ideal feed additive for some fish in winter. Adding betaine to feed can greatly reduce the mortality of fry. Betaine can be used as a food attractant. In addition to relying on vision, fish feeding is also related to smell and taste. Betaine is an ideal food attractant because of its unique sweetness and sensitive freshness of fish and shrimp. It has the functions of strong feeding attraction, improving feed palatability, shortening feeding time, promoting digestion and absorption, accelerating the growth of fish and shrimp, and avoiding water pollution caused by feed waste. Betaine can increase appetite, enhance disease resistance and immunity. It can solve the problems of refusal of sick fish and shrimp to bait and compensate for the reduction of fish and shrimp food intake under stress. Betaine, a highly water soluble and therefore diffusible compound, stimulates the olfactory bulb of fish. It is found in relatively high quantities in marine invertebrates, ganisms, and some plants (Meyers, 1987). Betaine is an effective attractant to several aquatic species. The main physiological or metabolic functions of betaine are related to osmoregulation and methyl donation. In fish, betaine can protect cells against dramatic changes in osmotic pressure. Betaine also helps prevent enzyme inhibition and plays an important role in tissues as a methyl donor in protein and energy metabolism.

Herbal betaine was added to a basal diet for rainbow trout; feed intake and growth were significantly higher and did not differ from the control fed a fishmeal-based diet. In combination with amino acids, betaine has produced encouraging results in fish and shellfish. The commercial feed attractant, a betaine/amino acid mixture, produced higher growth in Fish and Shrimp. A diet supplemented enhanced growth, feed intake, and survival in aquaculture.



Herbal Betaine Powder

Herbal betaine, derived from certain plants, is a naturally occurring compound that has gained attention in aquaculture for its potential benefits. Betaine is known for its osmoregulatory functions, helping organisms maintain water balance and counteracting osmotic stress. In aquaculture, where maintaining optimal water conditions is crucial for the health and growth of



aquatic species, betaine can play several roles:

1. **Osmoregulation:** Betaine helps aquatic organisms regulate their internal osmotic pressure, particularly in environments where salinity levels fluctuate. This is particularly important in species such as shrimp and fish, which are sensitive to changes in water salinity.
2. **Stress reduction:** Aquaculture environments can subject organisms to various stressors such as handling, transportation, and changes in water quality. Betaine has been shown to reduce the negative effects of stress by acting as an Osmo protectant and by supporting the synthesis of certain stress-related proteins.
3. **Improving feed efficiency:** Betaine supplementation in aquafeed has been reported to enhance feed intake, nutrient utilization, and growth performance in various aquatic species. It can improve the efficiency of feed conversion, leading to better growth rates and overall health.
4. **Enhancing immune function:** Some studies suggest that betaine supplementation can bolster the immune system of aquatic organisms, making them more resistant to diseases and pathogens. This is particularly relevant in intensive aquaculture systems where disease outbreaks can have significant economic consequences.
5. **Reducing ammonia toxicity:** In aquaculture systems, ammonia accumulation from waste products can be toxic to aquatic organisms. Betaine has been shown to mitigate the negative effects of ammonia toxicity by reducing its impact on fish and shrimp.
6. **Antioxidant properties:** Betaine exhibits antioxidant properties, which can help reduce oxidative stress in aquatic organisms. This is important for maintaining cellular health and overall vitality, especially in conditions of environmental stress.
7. **Enhancing reproductive performance:** Some studies suggest that betaine supplementation can positively influence reproductive performance in aquatic species, leading to improved spawning success and larval survival rates.

It's important to note that while herbal betaine holds promise as a supplement in aquaculture. Its effectiveness can vary depending on factors such as species, culture conditions, and dosage. Research into optimal usage and application methods is ongoing to maximize its benefits in aquaculture systems.

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