



## Gaicho - A New Dimension in Cotton Seed Treatment

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### ABSTRACT

*Imidacloprid is the active ingredient of Gaicho®. It belongs to the new chloronicotinyle group of active ingredients. It is user-safe and environmentally friendly with good biological effectiveness and root systemic efficacy. Field tests in various cotton producing countries have shown that Gaicho performs well against early season sucking pests. Its low mammalian toxicity and mode of action give it advantages when incorporated in integrated pest management or integrated resistance management programmes.*

### Introduction

Imidacloprid has been accepted world-wide as a seed dressing agent (registered in more than 60 countries). Crops in which the product can be used extend from cotton in the USA and 16 other cotton producing countries to sugarbeets, corn and sunflower in Europe. The active ingredient, imidacloprid (Gaicho®) belongs to the new chloronicotinyle group of chemistry. It is a user-friendly, biologically highly effective product with excellent root systemic efficacy.

### Mode of action / Product profile

The action of imidacloprid is based on interference with the transmission of impulses in the nerve system of insects. Imidacloprid effects nicotinic acetylcholine receptor. In contrast to acetylcholine, imidacloprid is only slowly degraded in the insects. Because of this, substantial disruption to nerve transmission is caused within the nervous system, leading to the lethal action.

Imidacloprid has low mammalian toxicity (rat oral LD<sub>50</sub> 450 mg/kg). It also exhibits other favourable dermal inhalation toxicity and skin function damage. In terms of ecotoxicological properties, it fulfils all the requirements now placed on a crop-protection agent. Imidacloprid has low fish toxicity and no known ecologically adverse effects.

Imidacloprid offers outstanding possibilities for soil and seed treatment and excels in this respect the standard products. The LD<sub>95</sub>-value in case of the root-systemic action of imidacloprid against *Myzus persicae* is only 0,04 ppm when incorporated in the soil at 10 ppm, the product offers already a long-lasting protection over 12 weeks against sucking insects such as *Myzus persicae*. The standard active ingredients show neither a good comparable root systemic activity, however, with a by far higher water solubility.

Imidacloprid applied as a seed treatment has the added benefit of sparing beneficial insects in the cotton system. It also showed excellent activity against insect strains that developed resistance against the conventional insecticides.

### Cotton - growing aspects

In cotton, imidacloprid has shown good biological efficacy against all important early pests, including aphids, white fly and thrips. To date, it has been common practice to apply granules with the seed or sprays after emergence to control these pests. Imidacloprid, by contrast, can be used as a liquid seed dressing. Linter removal and efficient seed sorting are important although Gaicho adherence to the bare seed surface is good.

### Cotton - Field results

Studies at Mississippi State University have shown control of early pests is of importance to successful cotton cultivation. Over 75 % of the total yield is made up by the first ten cotton shoots and the first-formed flowers and bolls. Seed treatment with Gaicho provides early protection. In the US, early infestation with thrips species and with leaf hoppers is important.

In 13 university trials from 1995 250 g ai/100 kg of Gaicho application achieved excellent results against thrips (untreated 5.7 thrips/plant; Gaicho 1 thrips/plant; Aldicarb 1 thrips/plant). - In the cotton belt area of Tennessee, Gaicho has demonstrated high biological performance in 13 field trials against *Thrips palmi*. Thrips damage rating for untreated plots was 3.7 compared to 2.1 for Gaicho 2,1 and 2.2 for furrow insecticides.

In studies evaluated in Louisiana in 1996, Gaicho seed treatment against *Aphis gossypii* offered long lasting protection from germination. The yield increases in studies conducted by fifteen universities in the United States show the economic advantages of Gaicho.- Seed dressing with Gaicho (250 g ai/100 kg) in these trials achieved a fiber yield more than 200 kg /ha higher than the control. At the current cotton price of about US dollar 1,67/kg this means a profit increase of more than 300 US dollar/hectare.

Seed treatment with Gaicho is not considered to be inferior to granulate application of a comparison substance, despite the smaller rate of active ingredient per hectare (Gaicho with 250 g ai/100 kg result in 40

g ai/ha; Aldicarb - in furrow application with 588g ai/ha).

In trials in the USA, Gaucho seed treatment resulted in plants with significantly more leaf area, taller plants and an increase in squares per plant in the early part of the season. In Pakistan, where cotton leaf curl virus, transmitted by whitefly (*Bemisia tabaci*, Genadius) is a major constraint to cotton production, Gaucho can offer protection from sucking pests for up to two months. In the Nile Delta of Egypt, treatment with Gaucho resulted in 10% larger plants with a yield increase of 15%.

### **Further aspects**

Gaucho is a product that can be incorporated with advantages in IPM and IRM programmes. The mode of action provides protection against nearly all the important early season sucking pests in cotton. It has outstanding user-safety and environmental friendliness and permits a reduction in the use of insecticide sprays.

### **References**

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