PestBarrier®
A Division of Bird Barrier America, Inc.

The Science Behind Cimi-Shield

Complex Polypeptide Protein as an Emulsifier, Silicates as Reservoirs (Porous Carriers)

Background
The scientists behind Cimi-Shield are familiar with the use of complex polypeptide protein molecules in medical implant procedures and with the pharmaceutical concept and use of porous carriers. As a protection against bacterial and viral infections implant devices are first coated with a polypeptide protein solution. When bacteria and virus come in contact with the protecting protein barrier, their outer membrane is dissolved or emulsified. This kills the bacteria or virus and prevents infection. Anyone that has taken an encapsulated medicine time delayed to be released in the digestive tract rather than the mouth has experienced the effect of a porous carrier.

The Theory
Because polypeptide protein molecules are particularly complex and susceptible to modification having suitable donor and acceptor groups, it was reasoned that these molecules could be bio-engineered to interact with the esters that form the waxy outer layer of the bed bug and other morphologically similar insects. The interaction would cause the ester to dissolve or emulsify, thereby permitting inner fluids to be released by evaporation. This process kills. Human beings and other mammals do not have waxy outer layers held in place by ester bonds and are therefore unaffected.

Protein Source and FIFRA25(b) Exempt Status
The US Environmental Protection Agency Office of Pesticide Programs has published a notice entitled "Pesticide Registration (PR) Notice 2000-6." In part, the publication regards exemptions under FIFRA section 25(b). "Appendix A" of PR Notice 2000-6 provides that soybean oil, item number 28, is an exempt "active" ingredient. We have found this to be an acceptable source of the food grade protein. Our proprietary process enables the completed product to quickly react with the waxy outer layer of the bed bug and other morphologically similar insects such as cockroaches, ants, millipedes, carpet beetles, fleas and others. As with the proteins that react with the outer membrane of bacteria and virus, there is reaction with the processed soybean oil protein and the waxy outer layer of the target insect. The protein causes the ester bonds that form the waxy outer layer to break. Once these molecular bonds have been broken, emulsified, the insect's inner fluids (about as much as would come from a single drop from an eye dropper) become subject to evaporation. The loss of these fluids causes the insects to die (in 45 to 90 seconds).

Residual or Prevent
In order to provide a residual effect after application, we determined that silicate particles might be added so that the tubules that they contain might provide a storage or reservoir for the liquid protein. When the product is diffused as a liquid the silicate particles remain as they become enmeshed in fabrics and textiles. When these enmeshed particles are disturbed by a crawling bed bug or other morphologically similar insect (American and German cockroaches, silverfish, ants, fleas, ticks and others) the reserved protein liquid is spilled. Where the particles are at a height sufficient to come into contact with the torso of the insect's body, the liquid spills onto its torso and the emulsification process is begun. The particular silicates were chosen because they are regarded as "exempt" inert ingredients under FIFRA regulations and are found in what EPA has termed the ***4A*** list.

The quantity of silicate porous carrier is carefully measured against its rate of deterioration so as to provide an amount sufficient to provide a continuing efficacy for the twelve month time period.

Where a bed bug infestation is present more than 50% of the total population will be in the form of eggs which will hatch over a 10 to 15 day period. It is likely that many of these eggs will survive a standard pesticide treatment as they are often insulated and well hidden in wall voids and under carpeting. The residual feature is necessary to address this problem.

Mechanical Agent/Resistance
Because the waxy outer layer, a body part, is actually removed this is termed mechanical. The commonly used toxins do not remove but rather interfere with body function and are therefore not mechanical. Evolutionary resistance has made some strains resistant and others completely immune to non-mechanical killers. There is neither resistance nor immunity to mechanical agents.

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