



DEPOSITION AND DRIFT REDUCTION AGENT

TECHNICAL INFORMATION BULLETIN

InCHECK spray adjuvant makes use of unique technologies and is designed to optimize soil-directed pesticide performance on turfgrass by improving deposition of the spray application onto the soil surface. By reducing the number of fine and large droplets in the application spray, InCHECK improves coverage and reduces drift and evaporation of pesticides being applied by spray equipment.

Research indicates that the effectiveness of a pesticide (as much as 70 percent) is closely connected with the spray application. Effectively transporting a pesticide to the target location is of paramount importance, and is closely associated with the physical characteristics of the spray solution. Overcoming problems with spray drift and spray deposition are now recognized as important considerations for golf course superintendents as they develop soil-directed spray so part of effectively transporting a pesticide to the target location.

Drift

Drift is normally a function of droplet size, wind speed, and height of the spray boom. Spray droplets with diameters of 150 microns or less tend to drift away from targeted areas. Drift reduction is a priority near sensitive sites which are common on golf courses.

Drift results in a waste of product, reduces the effectiveness of your application, and can damage crops that are economically or aesthetically important. Pesticide that drifts off-target also can hurt wildlife and contaminate water supplies.

When pesticide molecules volatilize (evaporate into the air), they can move downwind as a vapor. This form of drift is related to the product, not to the type of application method used. A 20 micron droplet will travel less than 1 inch in less than one second before the water droplet evaporates. Droplets less than 100 microns in size reach a horizontal trajectory in a very short time and evaporate rapidly.

Droplets over 150 microns in size resist evaporation much more than smaller droplets because of their large surface area. Therefore, the potential for drift rapidly decreases when the diameter of droplets is increased to about 150 microns. **An excellent way to minimize drift is to use spray additives that increase spray droplet size. Tests indicate that, in some cases, drift control additives can reduce downwind drift deposits by 50 to 80 percent.**

Drift control additives are a specific class of chemical adjuvants and should not be confused with such products as surfactants, wetting agents, spreaders, and stickers.

Deposition

In addition to controlling drift, many golf course superintendents are turning to specialized deposition agents to ensure their pesticides reach the target site.

Most deposition agent adjuvants, are referred to as “stickers,” because they act by increasing the adhesion of solid particles to the target surface. These adjuvants actively decrease the amount of pesticide that washes off during plant surfaces during application or rainfall events.

Unfortunately, this is not what a golf course superintendent wants when working with soil directed pesticides. Many deposition agents also include a wetting agent to make a general purpose product that both spreads and adheres to the target surface – again, this is not what you want when applying a soil-directed pesticide to your turfgrass. **What is needed when applying soil-directed pesticides is a product that prevents the applied spray from adhering to plant parts.**

Adjuvants

Spray adjuvants can be categorized into two groups: activator adjuvants and special-purpose or utility adjuvants.

Activator adjuvants. are used primarily to improve the “activity” of the applied pesticide product. These enhancements (both physical and chemical) are designed to improve absorption and, resulting in a more efficacious and efficient use of the pesticide. Surfactants, oils, and nitrogen-based fertilizers fall into the category of activator adjuvants.

Nonionic surfactants are often used with systemic pesticides and help pesticide sprays penetrate plant cuticles. They are also used to improve insecticide deposition on the surface of plant surfaces. Furthermore, nonionic surfactants are compatible with most pesticides, and most EPA-registered pesticides that require a surfactant recommend a nonionic type.



Special purpose/utility adjuvants. Special purpose/utility adjuvants modify the physical characteristics of the spray solution. Simply put, they help make the spray application process go better and many fall within the following categories:

- drift control agents
- deposition aides
- thickeners
- acidifiers,
- buffers
- colorants
- defoamers

InCHECK is classified as a Special purpose/utility adjuvant inasmuch as it corrects specific physical characteristics of the spray solution that can adversely affect the actual application of the pesticide.

InCHECK's spray adjuvant's unique technology is designed to optimize soil directed pesticide performance on turfgrass by improving deposition of the spray application onto the intended target. In addition, by reducing the number of fine and large droplets in the application spray, InCHECK improves coverage and reduces drift and evaporation of pesticides being applied by ground or air.

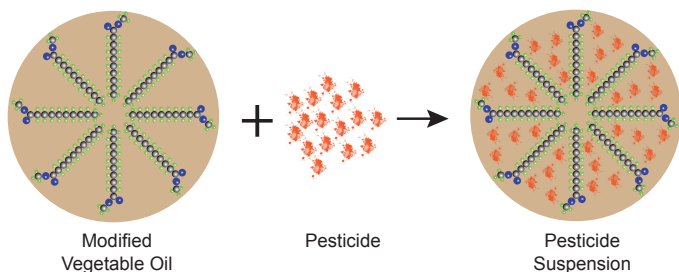
InCHECK Technology

Unlike other drift control adjuvants, InCHECK does not negatively affect spray pattern -- even when using air assisted type nozzles. InCHECK should be used in conjunction with proper spray equipment selection set-up and use including boom height, nozzle type, size and pressure. Along with good judgment and the proper selection and use of spray equipment, InCHECK can help the golf course superintendent ensure the performance of soil directed pesticides is optimized.

InCHECK works in a very different manner as compared with most agricultural spray adjuvant products. InCHECK not only increases the average spray droplet size, but also modifies the spray droplets so they do not adhere to grass blades and thatch which improves the amount of pesticide deposited on the soil surface - reducing drift and improving the uniformity and quality of spray deposits.

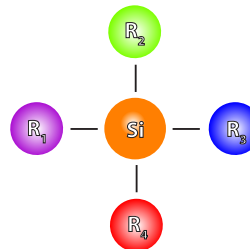
COMPONENTS

Modified vegetable oil. InCHECK contains a modified vegetable oil in its Special purpose/utility adjuvant. Pesticides are suspended as minute globules in the modified vegetable oil. The modified vegetable oil enhances pesticide solubility in the tank and in the spray deposit and improves the pesticide spray emulsion properties.



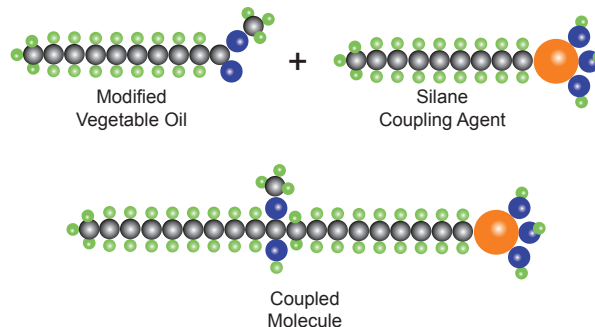
Emulsifiers. In addition to its methylated vegetable oil, InCHECK contains an organosilane-based emulsifier complex containing a **silane coupling agent** and a **silane water repellency agent**.

Silanes are the basic building blocks of silicone chemistry. A silane is a monomer with a chemical formula:

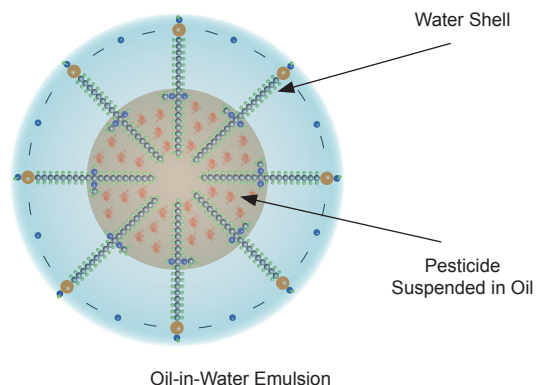


Functional groups attached to the Silicon atom make possible, large number of combinations. This explains the versatility of silanes and their ability to be used in a variety of ways with carbon-based chemicals. Indeed, silanes' unique ability as coupling agents, cross linking agents and surface modifiers make them very useful for "tuning" adjuvant formulations.

Coupling agents are silane molecules carrying two different reactive groups on their silicon atom so that they can provide a stable bond between two otherwise nonbonding and incompatible surfaces (including other silanes).

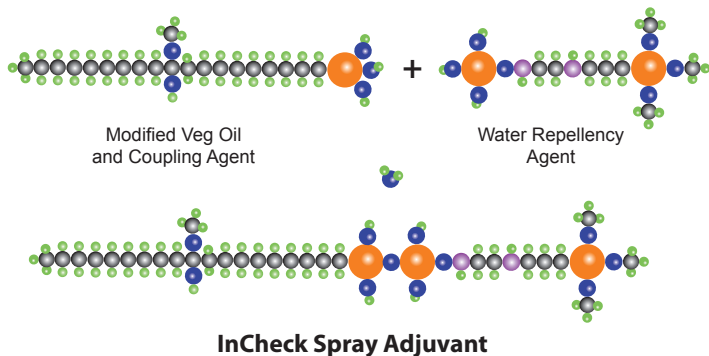


In the case of InCHECK, the coupling agent acts as an emulsifier between the pesticide/oil surface and water molecules – creating a stabilized oil-in-water emulsion. Research has shown that the InCHECK technology creates significantly fewer smaller spray droplets (under 200 um) with most spray tips – without increasing the number of large drops. Mean droplet speed (velocity) also increases with the use of InCHECK.

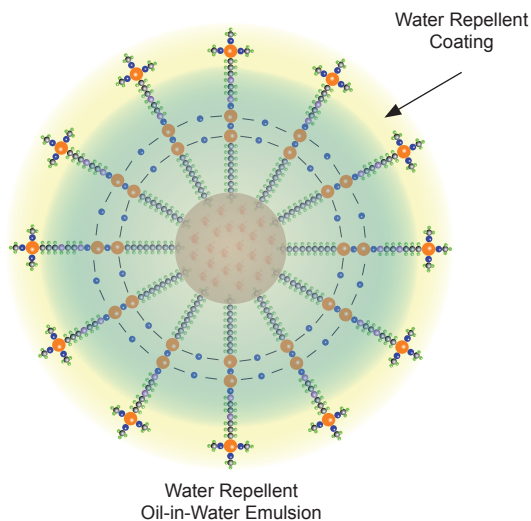




Water repellency agents in the InCHECK formulation are silane-based molecules that add a hydrophobic, “water repellent coating” to spray water droplets.



This water repellent coating increases the surface tension of the vegetable oil/silane emulsion, resulting in spherical, “superhydrophobic” water drops with contact angles that may exceed 120 degrees.



The purpose of adding a water repellent agent to the InCHECK formulation is to allow as many pesticide containing spray droplets as possible to “bounce” off grass and thatch surfaces in order to facilitate the maximum amount of pesticide reaching the soil surface.

USE DIRECTIONS

DIRECTIONS FOR GENERAL TURF USE

GREENS, TEES, FAIRWAYS, LAWNS AND SPORTS TURF

The proper rate of InCHECK is dependent upon the type of pesticide formulation being applied. First, determine the pesticide formulation being applied such as liquid, flowable, or powder. Then select the proper rate according to the following table:

Rate of InCHECK	Pesticide Formulation*
4 oz. /A or 300 ml. /hec	E.C. or A.S. – liquid formulations
4 oz. /A or 300 ml. /hec	D.F. or W.P. – dry formulations
4 oz. /A or 300 ml. /hec	L.F. – liquid flowables

*E.C. = Emulsifiable Concentrates, A.S. = Aqueous Solution, D.F. = Dry Flowables, W.P. = Wettable Powders, and L.F. = Liquid Flowables.

Before mixing pesticides with InCHECK, conduct a jar test to determine compatibility.

DO NOT ADD THIS PRODUCT AT A RATE THAT EXCEEDS 1% OF THE FINISHED SPRAY VOLUME

For use as a deposition aid with pyrethroid insecticides or other insecticides and fungicides: 2 – 4 oz. /A (150 -300 ml. / hec.

Aquatic Use: Use 4—6 oz. /A (300-600 ml. / hec) of surface water for aquatic weed control applications. Always follow herbicide label for specific directions and precautions.

MIXING:

Add InCHECK after pesticides or other adjuvants are added but prior to complete filling of the spray tank.

For Direct Injection: InCHECK can be applied through injection systems where InCHECK is added to one of the system’s chemical injection tanks. An in-line mixing chamber is recommended.

- Step 1 Add InCHECK to the chemical injection tank
- Step 2 Pump the correct amount of InCHECK into the line
- Step 3 Pump the proper amount of water, pesticide, and other adjuvants into the line for mixing with InCHECK and chemicals before going into the spray boom

NUMERATOR

TECHNOLOGIES, INC.

P.O. Box 868
SARASOTA, FLORIDA 34230
941.807.5333