

Silwet* 408 Spray Adjuvant



MARKETING BULLETIN

SPECIALTY FLUIDS - AGRICULTURE

Silwet 408 spray adjuvant is a superspreading surfactant based on a trisiloxane ethoxylate. Silwet 408 spray adjuvant lowers the surface tension of spray solutions, beyond that which is achievable with conventional adjuvants.

Typically, Silwet 408 spray adjuvant (at 0.1 wt %) gives an aqueous surface tension of < 22 mN/m. On the other hand, an octylphenol ethoxylate containing 10 EO units (a commonly used nonionic surfactant) at 1.0 wt % gives a surface tension of only 30 mN/m.

Silwet 408 spray adjuvant can help lower the aqueous surface tension more effectively than conventional spray adjuvants.

Because Silwet 408 spray adjuvant is a superspreading surfactant, the contact angle of spray solutions on leaf surfaces is reduced, leading to an increase in spray coverage (Figure 1).

Additionally, under specific conditions, Silwet 408 spray adjuvant promotes rapid uptake of agrochemicals into plants via stomatal infiltration. Spray solutions taken into plants in this way become rainfast, thereby improving application reliability (Figure 2).

Unlike other trisiloxane alkoxyates, which are negatively affected by oil based components (*i.e.* EC formulations, spray oils etc.), Silwet 408 spray adjuvant provides enhanced spreading in many of these types of formulations relative to competitive organosilicone based adjuvants (Figure 3).

Silwet 408 spray adjuvant is nonionic in nature, making it useful with a broad range of agrochemical formulations.

Key Features and Typical Benefits

- Superspreader for soluble liquid and emulsifiable concentrate formulations
- Promotes spray volume reduction
- Promotes rapid uptake of agrochemicals (rainfastness)
- Can significantly improve spray coverage
- Nonionic
- Meets EPA 40 CFR §180.910 requirements⁽¹⁾

Typical Physical Properties

Property	Result
Surface Tension (0.1%, mN/m) ^(a)	21.5
Cloud Point (0.1 wt%), °C	< 10
Viscosity (cSt at 25 °C)	35
CMC (Wt%) ^(b)	0.007
Pour Point, °C	-8
Specific Gravity at 25 °C	1.020
Flash Point ^(c) °C	118

Typical physical properties are average data and are not to be used as or to develop specifications.

⁽¹⁾ The components meet the requirements of U.S. EPA regulation 40 CFR §180.910, and are therefore exempt from tolerances in food when used as an inert ingredient in agricultural applications in accordance with the other conditions of that regulation.

^(a) Surface Tension by Wilhelmy Plate Method; ^(b) Critical Micelle Concentration; ^(c) Pensky-Martens Closed Cup, ASTM Method D93

*Silwet is a trademark of Momentive Performance Materials Inc.

General Considerations for Use

In Agrochemical Formulations

Silwet 408 spray adjuvant may be used as a component in agrochemical formulations. Although organosilicone surfactants are subject to hydrolysis under acidic or basic conditions, optimum performance is achieved by buffering the formulation to pH 6.5 -7.5. Additionally, it is recommended that Silwet 408 spray adjuvant be used at a concentration of at least 5%, based on the total formulation.

As A Tank Mix Adjuvant

Silwet 408 spray adjuvant, when used as a tank-side adjuvant may be used to improve spray coverage, improve uptake or to allow for a reduction in spray volume. Silwet 408 spray adjuvant is most effective as a tank-side adjuvant when spray mixtures are 1) within a pH range of 5-8, and 2) used within 24 hours of preparation.

High spray volumes, coupled with high surfactant rates, are not required to achieve sufficient coverage with Silwet 408 spray adjuvant. In fact, Silwet 408 spray adjuvant has the potential to provide adequate coverage in many low volume spray applications at rates between 0.025% and 0.1%.

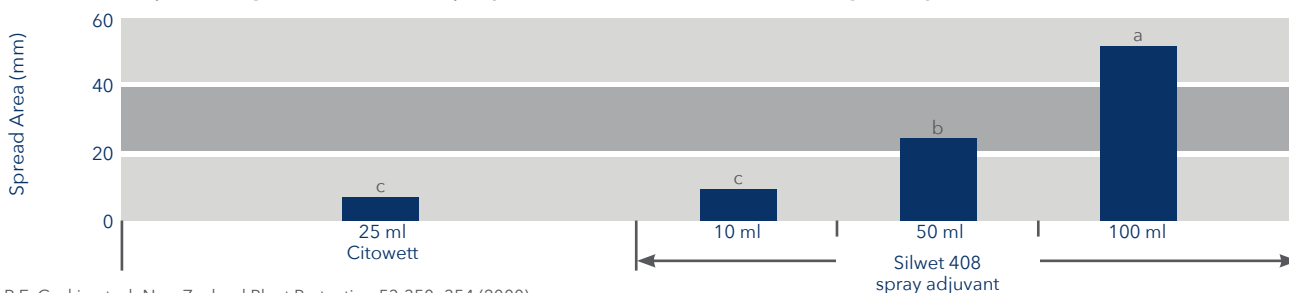
Potential Applications

Silwet 408 spray adjuvant has been used successfully in spray applications globally. Typical applications include:

Application	Typical Use Rate ^(a)
Plant Growth Regulators	0.025% to 0.05%
Herbicide	0.025% to 0.15%
Insecticide	0.025% to 0.1%
Fungicide	0.015% to 0.05%
Fertilizers and Micronutrients	0.015% to 0.1%

Figure 1: Spreading

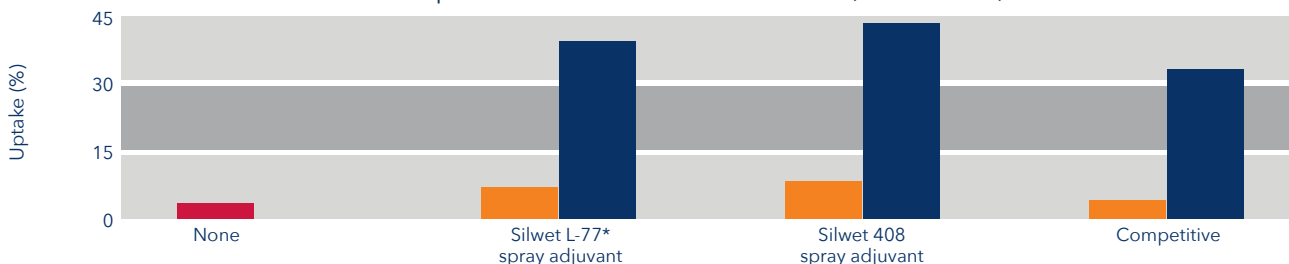
Spreading of Mancozeb Spray Formulation on Potato Foliage (Adjuvant Rate: X ml/100 Liters)



R.E. Gaskin et. al; New Zealand Plant Protection 53:350 -354 (2000)
 Note: Test data. Actual results may vary.

Figure 2: Uptake

Uptake of ¹⁴C-DOG into Bean Leaf (10 Min. A.T.)

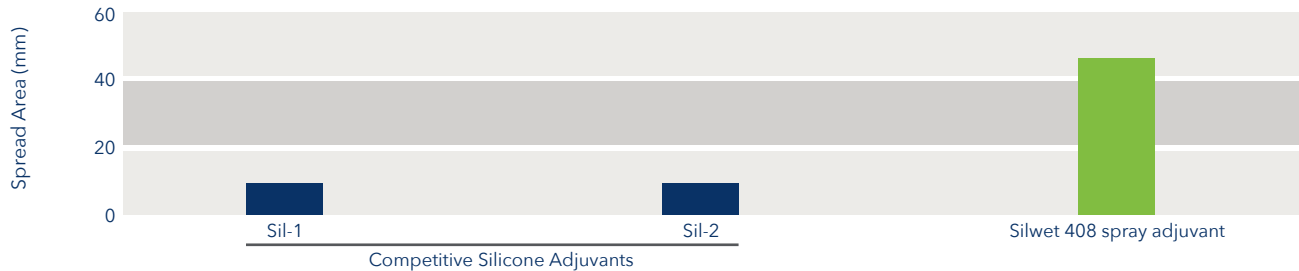


DOG = Radio Labeled Deoxyglucose uptake at 10 Minutes After Treatment
 Note: Test data. Actual results may vary.

Potential Applications (continued)

Figure 3: Spreading of Oil Based Agrochemicals (EC Formulation)

Influence of Adjuvant on "Tank-Mix" Spreading Properties
Organosilicone (0.1 wt%) + Triclopyr, Butoxy Ester EC at 0.3%



Triclopyr as the butoxy ester at 600 g/L (Emulsifiable Concentrate Formulation)
Note: Test data. Actual results may vary.

Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.momentive.com or, upon request, from any MPM representative.

For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Customer Service Centers

Worldwide

4information@momentive.com

T +1 614 986 2495

T +1 800 295 2392

North America**Silicones**

T +1 800 332 3390

**Consumer Sealants/
Construction Sealants
and Adhesives**

T +1 877 943 7325

Latin America**South America**

T +55 11 4534 9650

**Mexico and Central
America**

T +52 55 2169 7670

**Europe, Middle East,
Africa and India**

T +00 800 4321 1000

T +40 21 3111848

Pacific**China**

T +800 820 0202

T +86 21 3860 4892

Japan

T +0120 975 400

T +81 276 20 6182

Korea

T +82 2 6201 4600

Malaysia

T +60 3 9206 1532

Disclaimer

THE MATERIALS, PRODUCTS AND SERVICES OF MOMENTIVE PERFORMANCE MATERIALS INC. AND ITS SUBSIDIARIES AND AFFILIATES (COLLECTIVELY "SUPPLIER"), ARE SOLD SUBJECT TO SUPPLIER'S STANDARD CONDITIONS OF SALE, WHICH ARE INCLUDED IN THE APPLICABLE DISTRIBUTOR OR OTHER SALES AGREEMENT, PRINTED ON THE BACK OF ORDER ACKNOWLEDGMENTS AND INVOICES, AND AVAILABLE UPON REQUEST. ALTHOUGH ANY INFORMATION, RECOMMENDATIONS, OR ADVICE CONTAINED HEREIN IS GIVEN IN GOOD FAITH, SUPPLIER MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, (i) THAT THE RESULTS DESCRIBED HEREIN WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN INCORPORATING ITS PRODUCTS, MATERIALS, SERVICES, RECOMMENDATIONS OR ADVICE. EXCEPT AS PROVIDED IN SUPPLIER'S STANDARD CONDITIONS OF SALE, SUPPLIER AND ITS REPRESENTATIVES SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS OR SERVICES DESCRIBED HEREIN. Each user bears full responsibility for making its own determination as to the suitability of Supplier's materials, services, recommendations, or advice for its own particular use. Each user must identify and perform all tests and analyses necessary to assure that its finished parts incorporating Supplier's products, materials, or services will be safe and suitable for use under end-use conditions. Nothing in this or any other document, nor any oral recommendation or advice, shall be deemed to alter, vary, supersede, or waive any provision of Supplier's standard Conditions of Sale or this Disclaimer, unless any such modification is specifically agreed to in a writing signed by Supplier. No statement contained herein concerning a possible or suggested use of any material, product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Supplier covering such use or design, or as a recommendation for the use of such material, product, service or design in the infringement of any patent or other intellectual property right.