

ISAA 2022 under the auspices of:



INSTRUCTIONS TO AUTHORS

All papers and Posters should be sent electronically to the webpage: abstracts@isaanetwork.org

If you have any questions or concerns, you can also write directly to:

Editor:

Dr. Peter Westbye

Chief Scientific officer ISAA 2022

Nouryon

Hamnvägen 2,

444 45 Stenungsund

Sweden

Email: peter.westbye@nouryon.com

Phone : +46 (0)733 855 026

PREPARATION OF EXTENDED ABSTRACTS

Length (and overall recommendations)

The acceptable length of the extended abstract (inclusive of tables and figures) is **three pages** for all presenters doing 30 minutes or 20 minutes presentations.

Focus should be on the scientific question (i.e. what is being investigated and why) as well as the conclusions from the study. Use the 3 pages in the best way to support your conclusions. If the method itself is central to the study, the method can be described and reference for further reading is encouraged. All methods that will be presented in the presentation doesn't need to be described in detail, they can be mentioned briefly, with a reference or skipped in the extended abstract. If the chemistry of the samples study is of importance, describe the differences.

Both the extended abstract and the oral presentation must be of a scientific format and attitude. The Program Committee recognizes that commercial adjuvant products must be evaluated and results from these trials presented in a scientific manner. However, the extended abstract and presentation can't be used for product promotion.

Typescript

Papers must be written in **English (UK version)**. Authors from English speaking countries other than the UK should use the corrector in their word-processing programme to filter non- UK words. Manuscripts should be written on A4 paper (210x297 mm) with a 30 mm margin; the printed area must not exceed 150 x 237 mm. The **required typeface is Times New Roman 12 pt, single-spaced**. Do not indent paragraphs but leave one line space between them.

Title

The title of the paper should be in capitals in **14 pt Times New Roman bold**, centred on the page. Titles should be limited to approximately 10 words.

Authors

Names of authors, giving preferred forename, should appear centred one line space below the title in 12 pt. The name of the author making the presentation at the Symposium should be underlined.

Affiliation and Address

One line space below the title, centred, *in 12 pt italicised*. Where there are multiple authors with different affiliations, identify with superscript numbers (^{1 2 3}). The email address of the corresponding author should be included one line space below the addresses, centred, *in 12 pt italicised*.

Headings

- Main section headings (e.g., Summary, Introduction, etc.) are in capitals in **12 pt Times New Roman bold**, centred on the page.
- Sub-headings are in **12 Pt Times New Roman bold**, with the initial letter of each word in capital, and aligned against the left-hand margin.
- Sub-sub-headings are in **12 pt Times New Roman italic** with the initial letter of only the first word in capital, aligned against the left-hand margin.

Text and Sections

Text commences on the line immediately below its section title. A single line space separates main sections, sub-sections and sub-sub sections. If possible, adhere to the following structure: **Summary** should mention what was investigated and main conclusions. Short and capturing the core of your work. The following headlines should be in the extended abstract:

Introduction; Materials and Methods; Results and Discussion. Optional headlines depending on need are *Acknowledgements; References.*

SURFACTANTS AND PHYSICAL FACTORS AFFECTING ADHESION OF SPRAY DROPLETS ON LEAF SURFACES

Peter J.G. Stevens¹, W. Alison Forster¹;
Dennis S. Murphy², George A. Policello² and G. 'Jerry' J. Murphy²

¹*Forest Research Institute, Private Bag 3020, Rotorua, NZ*

²*OSi Specialties, 777 Old Saw Mill River Road, Tarrytown, NY 10591-6728, USA*

Corresponding author: stevens@fri.cri.nz

SUMMARY

The adhesion of droplets of aqueous surfactants impacting on pea leaves decreased as droplet size (110 to 880 μm diameter), velocity (0.3 to 2.8 m/s) and angle of incidence (0 to 67.5 degrees) increased. Increasing the concentration of seven nonionic surfactants (four organosilicones, two organics, and an organosilicone-organic blend; 0.05 to 0.5%) increased adhesion. The organosilicones, notably Silwet® L-77™, and the blend (20% L-77) provided greater adhesion than did the conventional organic surfactants.

INTRODUCTION

The application of pesticides to foliage requires that droplets of water-based sprays adhere to the waxy, water-repellent surfaces of the leaves on the target plants. Surfactants are wetters and facilitate adhesion, this being an important means by which surfactants can modify the activity of pesticide sprays (Seaman 1982). Differential retention of sprays can be a major factor contributing to the selectivity of herbicides, which may be reduced by the addition of surfactants (Davies *et al.* 1962).

Although aspects of the spray impaction process have been studied, a comprehensive investigation has not been undertaken previously. *etc.*

MATERIALS AND METHODS

Surfactants

Four organosilicone and two organic surfactants, and an organosilicone-organic blend (OSi Specialties) were used [0.05, 0.1, 0.2 and 0.5% (w/v)]:

Organosilicones

$(\text{CH}_3)_3\text{SiO}-[(\text{CH}_3)\text{RSi}]_x-\text{OSi}(\text{CH}_3)_3$

Silwet L-77 $x = 1$ $\text{R} = -\text{C}_3\text{H}_6\text{O}-(\text{C}_2\text{H}_4\text{O})_8-\text{CH}_3$

Silicone 1 $x = 1.7$ $\text{R} = -\text{C}_3\text{H}_6\text{O}-(\text{C}_2\text{H}_4\text{O})_8-\text{CH}_3$

Blend

20% Silwet L-77 + 80% polyalkylene oxide (proprietary composition; OSi Specialties)

Plants

Pea was selected as the foliar target for this study because a dense coating of crystalline, epicuticular wax makes its leaves extremely hard to wet (Green 1991a). The plants (*Pisum sativum* L. cv. Greenfeast) were grown under conditions reported previously (Green 1991b). The adaxial surfaces of fully expanded leaves, taken from plants 3 to 4 weeks after planting, were used immediately after excision. *etc.*

Tables

Tables must be numbered consecutively, in Arabic numerals, in the order in which they are referred to in the text. Tables should be inserted at the first suitable break in the text after the first reference to them in the text. Tables must fall within the typescript margins. Tables must provide adequate indication of experimental error and statistical significance of the data. Align Table with left margin. Each Table must have a caption in bold at the top. Column headings should be short and informative; alphabetic superscripts (^{a b c}) may be used to indicate footnotes to provide additional information. Units should be indicated in brackets; e.g. (L/ha). Please use horizontal lines (and not vertical) to delineate title, column headings, subheadings, data, and footnotes, as per the example provided. Authors must not use tabs when preparing Tables; use the Table insert in MS Word.

TABLE 1: Spray deposits ($\mu\text{g}/\text{cm}^2$) on canes from hydrogen cyanamide sprays (12 kg/600 L/ha) applied by different nozzles without and with adjuvants.

Treatment description	Cane position in canopy		
	near trunk	centre	small cane end
Flat fan nozzle	5.40 bc	5.21 bc	5.22 abc
+ adjuvant N2	5.13 bc	4.81 c	4.94 c
AI nozzle	5.54 abc	5.49 abc	5.30 abc
+ adjuvant N7	5.49 abc	6.00 ab	6.07 a

Means sharing common postscripts are not significantly different (LSD test, $P=0.05$).

Figures

Figures (including photos) must be numbered and added to the extended abstract as well as supplied as separate computer files. Computer-generated files should be 600 dpi for black and white line artwork, and 300 dpi for colour or greyscale artwork. They should be saved in jpg or tif formats. Incorporate legends to symbols within the figure, not in the caption.

Captions should be placed on a separate page at the end of the paper. Do not place captions within the figure.

Equations

Each equation must be centered on the line, with the number of the equation in parentheses placed on the far right. Leave one-line space above and below the equation. All symbols must be defined following the equation if not previously defined in the text.

References

In-text citations should contain the names of up to two authors (separated by &) and the year of publication, enclosed within brackets. Where there are more than two authors, the name of the senior author should be followed by *et al.* (italics). Do not use punctuation for citations in the text except for a semi-colon between separate references in the same bracket. The references should be listed fully in the References section **in alphabetical order**. Please use appropriate abbreviations for the names of journals. Reference examples are given below:

Journal

Bright H 1981. Life with trees. NZ J. For. Res. 11(4): 775-780.

Book

Hill WE, Black AR ed. 1984. "Eucalypts for Wood Production" CSIRO, Canberra.

Paper (chapter) in book

Swell E, Ward AB, Watson B 1995. Making paper whiter. In: Bola FD, Young M ed. Fundamentals of Papermaking. British Paper Makers Association, London. Pp.118-131.

Additional Source Material on Internet

The samples below indicate how citations of particular electronic sources might be made, e. g.::
World Wide Web:

Limb, Peter. "Relationships between Labour & African Nationalist/Liberation Movements in Southern Africa." [http://neal.ctstateu. edu/history/world_history/archives/limb-l.html]. May 1992

For more information please see : <http://www.fordham.edu/halsall/cite.html>.

Terminology

Abbreviations

Authors are referred to the Oxford Dictionary for standard abbreviations; for instance: cf, eg., ie., etc. Excessive use of technical abbreviations should be avoided. Where essential, the term should be given in full at the first mention, followed by the abbreviation in brackets; for instance: photosynthetic photon flux density (PPFD).

Units

The metric system must be used (e.g. L/ha not gal/ac;), employing standard SI nomenclature and units. Use kg ai/ha (kg ae/ha for acids) or g ai/ha (g ae/ha for acids) at first mention of a pesticide use rate. Thereafter, use kg/ha or g/ha. Note that mixed substances should be expressed in the form: methanol + water (7 + 3 v/v). When expressing adjuvant concentrations on a percent base, please indicate at first mention % (w/v), % (v/v) or % (w/w).

Nomenclature

The nature of adjuvants (e.g. nonionic surfactant) must be given at the first mention (see Appendix I) and their chemistry and source in the Materials and Methods section; for instance: Silwet L-77 (α - 1,1,1,3,5,5, 5-heptamethyltrisiloxanyl propyl- Ω -methoxypoly[ethylene oxide]; mean EO 8; Witco Corporation; Organosilicones Group). Note here that the standard abbreviation for ethylene oxide is EO; PO should be used for propylene oxide. For assistance with chemistry and nomenclature of adjuvants, authors should refer to:

- Ash, M.; Ash, I. (1980-85): "Encyclopedia of Surfactants, Vol.1-4" Chemical Publishing, New York.
- "McCutcheon's Emulsifiers and Detergents" Manufacturing Confectioner Publishing, Glen Rock.
- *Weed Sci.* 26(2): 204-5.

Where the composition of a product is proprietary, authors nonetheless must provide an indication of its nature and composition; for instance: Dyne-Amic (crop oil concentrate [COC]; a proprietary blend of nonionic organosilicone surfactant Silwet L-77, nonionic emulsifiers and vegetable oils; Helena Chemical Co.). Use generic terms whenever possible. Authors who are uncertain of adjuvant composition are recommended to refer to:

- Thomson, Lori 1998: "A Guide to Agricultural Spray Adjuvants used in the USA" Thomson Publications, Fresno.
- Adjuvant Reference 1999, CPR T&OR Supplement, C&P Press, New York.
- Manufacturer's technical data sheet
- Material safety data sheet

ASTM has developed terminology for adjuvants used with agrochemicals (**Appendix I**). GIFAP developed codes for the characterisation of pesticide formulations (**Appendix II**). We stress that use of the ASTM and GIFAP terminology throughout the manuscripts is highly recommended and appreciated.

The ISO common name for pesticides and other chemicals should be used, but the full chemical name (IUPAC nomenclature) must be given at the first mention or in the Methods and Materials section; for instance: glyphosate (*N*-(phosphonomethyl)glycine) as the isopropylamine salt, fenoxaprop-P ((*R*)-2-[4-[(6-chloro-2-benzoxazolyl)oxy]phenoxy]propanoic acid) as the ethyl ester. Note that in the case of salts of actives, amounts of chemical must refer to acid equivalent (ae).

Chemical names of pesticides should be used in preference to product tradenames, but the tradename, the type of formulation, and the source must be given at the first mention or in the Methods and Materials section; for instance: glyphosate isopropylamine (Roundup® Ultra; soluble concentrate [SL]; Monsanto), fenoxaprop-P-ethyl (Puma®; emulsifiable concentrate [EC]; AgrEvo). See **Appendix II** for formulation types and codes. Use trademarks ® and ™ when appropriate.

Common names of species are preferred where appropriate and unambiguous (e.g. bean: *Vicia* or *Phaseolus*) but the scientific name (genus and species in italics, with authority abbreviated as is customary) must be given in italics at the first mention or in the Methods and Materials section; for instance: broad bean (*Vicia faba* L.). Bayer code as an abbreviation for weed species is not acceptable. If the UK common name is not the only English name for a species, please use the UK-version. Example is fat hen and **not** common lambsquarters for *Chenopodium album* L.

APPENDIX I.

ASTM-APPROVED TERMINOLOGY

acidifier-a material that can be added to spray mixtures to lower the pH.

activator-a material that increases the biological efficacy of agrochemicals.

active ingredient-a component of the formulation that produces a specific effect for which the formulation is designed.

adjuvant-a material added to a tank mix to aid or modify the action of an agrochemical, or the physical characteristics of the mixture.

amphoteric surfactant-a surface-active agent capable of forming, in aqueous solution, either surface-active anions or surface-active cations depending on the pH.

anionic surfactant-a surface-active agent in which the active portion of the molecule containing the lipophilic segment forms exclusively a negative ion (anion) when placed in aqueous solution.

antifoaming agent-a material used to inhibit or prevent the formation of foam.

attractant-a material that attracts specific pests.

buffer or buffering agent-a compound or mixture that, when contained in solution, causes the solution to resist change in pH. Each buffer has a characteristic limited range of pH over which it is effective.

canopy penetrating agent-an adjuvant that increases the penetration of the spray material into the crop canopy. See **deposition aid**.

cationic surfactant-a surface-active agent in which the active portion of the molecule containing the lipophilic segment forms exclusively a positive ion (cation) when placed in aqueous solution.

colorant-a material used to alter the colour of the tank mix.

compatibility agent-a surface-active agent that allows simultaneous application of liquid fertiliser and agrochemical, or two or more agrochemical formulations, as a uniform tank mix, or improves the homogeneity of the mixture and the uniformity of the application.

crop oil concentrate-an emulsifiable petroleum oil-based product containing 15 to 20 % w/w surfactant and a minimum of 80 % w/w phytobland oil.

crop oil (emulsifiable)-an emulsifiable petroleum oil-based product containing up to 5 % w/w surfactant and the remainder of a phytobland oil.

crop oil (non-emulsifiable)-See phytobland oil.

defoaming agent-a material that eliminates or suppresses foam in the spray tank

deposition aid-a material that improves the ability of agrochemical sprays to deposit on targeted surfaces.

dormant oil-a horticultural spray oil applied during the dormant phase of the targeted plant. (See **horticultural spray oil**.)

drift control agent-a material used in liquid spray mixtures to reduce spray drift.

emulsifier-a surfactant that promotes the suspension of one immiscible liquid in another.

evaporation reduction agent-a material that reduces the evaporation rate of a spray mix during or after application, or both.

extender-a material that increases the effective life of an agrochemical after application.

foam suppressant-See defoamer.

foaming agent-a material that increases the volume or stability of the foam formed in a spray mixture.

humectant-a material which increases the equilibrium water content and increases the drying time of an aqueous spray deposit.

modified vegetable oil-an oil, extracted from seeds, that has been chemically modified (for example, methylated).

modified vegetable oil concentrate-an emulsifiable, chemically modified vegetable oil product containing 5 to 20 % w/w surfactant and the remainder chemically modified vegetable oil.

naphtha-based oil-a petroleum oil containing a majority of the naphtha fraction.

nonionic surfactant-a surface-active agent having no ionisable polar end groups but comprised of hydrophilic and lipophilic segments.

oil-See **petroleum, vegetable, paraffinic**, and so forth.

paraffinic oil-a petroleum oil (derived from paraffin crude oil) whose paraffinic carbon type content is typically greater than 60 %.

penetrant-a material that enhances the ability of agrochemical to enter a substrate or penetrate a surface.

petroleum oil-oil derived from petroleum; contains a mixture of hydrocarbons that are broadly classified as paraffins, naphthenes, aromatics, or other unsaturates, or combination thereof.

phytoblend oil-a highly refined paraffinic material with a minimum unsulfonated residue of 92% v/v.

spreader-a material which increases the area that a droplet of a given volume of spray mixture will cover on a target.

spreader/sticker-a material that has the properties of both a spreader and a sticker.

sticker-a material that assists the spray deposit to adhere or stick to the target and may be measured in terms of resistance to time, wind, water, mechanical action, or chemical action.

surface-active agent-a material that when added to a liquid medium modifies the properties of the medium at a surface or interface.

Note-**surface-active agent** is the general term which includes soluble detergents in liquid medium, dispersing agents, emulsifying agents, foaming agents, penetrating agents, and wetting agents.

surfactant-See **surface-active agent**.

vegetable oil-oil extracted from seeds; typically those of corn, cotton, peanut, rapeseed, sunflower, canola, or soybean.

vegetable oil concentrate-an emulsifiable vegetable oil product containing 5 to 20 % w/w surfactant and a minimum of 80 % w/w vegetable oil.

wetting agent-wetting agents can be considered synonymous with spreading agents in function.

APPENDIX II.

GIFAP CATALOG OF PESTICIDE FORMULATION TYPES

From: GIFAP Catalogue of Pesticide Formulation Types and International Coding System.- Second Edition. 1984 and from Addendum to Technical Monograph No.2 (Formulation Types and International Coding System). 1994.

Products Mostly Used in Dilution With Water

Code	Term	Description
CS	Capsule Suspension	A stable suspension of capsules in a fluid (normally intended for dilution with water before use).
EC	Emulsifiable Concentrate	A liquid, homogeneous formulation to be applied as an emulsion after dilution in water.
ED	Electrochargeable Liquid	Special liquid formulation for electrostatic (electrodynamic) spraying.
EO	Emulsion, Water in Oil	A fluid, heterogeneous formulation consisting of a dispersion of fine globules of pesticide in water in continuous organic phase.
EW	Emulsion, Oil in Water	A fluid, heterogeneous formulation consisting of a dispersion of fine globules of pesticide in an organic liquid in a continuous water phase.
GL	Gel - Emulsifiable	A homogeneous gelatinous formulation to be applied as an emulsion after dilution in water.
GW	Gel Water Soluble	A homogeneous gelatinous formulation to be applied as a true solution after dilution in water.
LV	Low Volume Liquid	
OF	Oil Miscible	A stable suspension of active ingredients in a fluid intended for dilution in an organic liquid before use.
SC	Suspension Concentrate	A stable suspension of active ingredients in a fluid intended for dilution with water before use.
SL	Soluble Concentrate	A liquid, homogeneous formulation to be applied as a true solution of the active ingredient after dilution in water.
TB	Tablet	Solid formulation in the form small, flat plates.
SG	Water Soluble Granules	A formulation consisting of granules to be applied as a true solution of the active ingredient after dissolving in water but which may contain insoluble inert ingredients.
WG	Water Dispersible Granules	A formulation consisting of granules to be applied after disintegration and dispersion in water.
SP	Water Soluble Powder	A powder formulation to be applied as a true solution of the active ingredient after solution in water but which may contain insoluble inert ingredients.
WP	Wettable Powder	A powder formulation to be applied as a suspension after dispersion in water.

Products Often Applied Undiluted

AL	Other Liquids Undiluted	
CG	Encapsulated Granule	A granule with a protective or release controlling coating.
DP	Dustable Powder	A free-flowing powder, suitable for dusting.
FG	Fine Granule	A granule in the particle size range from 300 to 2500 m.
GG	Macro Granule	A granule in the particle size range from 2000 to 6000 m.
GP	Flo-Dust	Very fine dustable powder for pneumatic application in a greenhouse.
GR	Granule	A free-flowing solid product of a defined granule size range ready for use.
MG	MicroGranule	A granule in the particle size range from 100 to 600 in.
SO	Spreading Oil	Formulation designed to form a surface layer on application to water

SU	Ultra Low Volume [ULVI Suspension	A suspension ready for use through ULY equipment.
UL	Ultra Low Volume [ULV] Liquid	A homogeneous liquid ready for use through ULV equipment.

Products for Seed Treatment

Code	Term	Description
DS	Powder for Dry Seed treatment	A powder for application in the dry state directly to the seed.
FS	Flowable Concentrate for Seed Treatment	A stable suspension for application to the seed either directly or after dilution
LS	Solution for Seed Treatment	A solution for application to the seed either directly or after dilution.
PS	Seed Coated with a Pesticide	
SS	Water Soluble Powder for Seed Treatment	A powder to be dissolved in water before application to the seed.
WS	Water Dispersible Powder Treatment	A powder to be dispersed at high concentration in water before application as a slurry to the seed.

Miscellaneous

AI	Unformulated Active Ingredient	
BR	Briquette	Solid block designed for controlled release of active ingredient.
OL	Oil Miscible Liquid	A liquid, homogeneous formulation to be applied as a homogeneous liquid after dilution in an organic liquid.
OP	Oil Dispersible Powder	A powder formulation to be applied as a suspension after dispersion in an organic liquid.
TC	Technical Material	
TK	Technical Concentrate	
XX	Others	