Field Screening of Surfactants with Implications for Increased Aphid, Thrips and Banana Bunchy Top Virus (BBTV) Management in Bananas

There are limited crop protection products (limited applications allowed/crop season) available to manage BBTV and other banana pests in Hawaii. Incorporation of spray surfactants may increase spray efficiency and minimize pest and disease populations. However, banana growers like papaya producers are very hesitant to use a spray surfactant at recommended label rates due to its ability to cause phytotoxicity or burning to fruit. Phytotoxicity means the degree to which a chemical or compound is toxic to plants or plant growth. We met with Hawaii’s IR-4 Program and consulted with Bayer Crop Science to request assistance in improving spray coverage, minimizing phytotoxicity issues on banana fruit, and enhancing the efficacy of a newly registered insecticidal product in Hawaii, Movento.

Our objective was to assist growers in improving spray coverage which involves: uniform application, application within recommended rate ranges, use of appropriate surfactants, and optimal penetration within the plant canopy & fruit column. We screened and identified 8 potential spray adjuvants: Hiwett (4 fluid ounces), Exit (18 fluid ounces), Latron (16 fluid ounces), Dyne-Amic (64 fluid ounces), Break Through (6 fluid ounces), Pure Spray (96 fluid ounces), Ag Aide (10 fluid ounces), and Indicator 5 (color indicator) in hopes to optimize insecticide coverage while minimizing the degree of phytotoxicity on fruit.

Chemicals of the past were mostly contact type of chemicals. New and reduced risk crop protection chemicals like Movento have different modes of action to control pests. Our goal was to increase the absorption of Movento into the tissue of the plant to maximize its systemic properties. Penetrating type of adjuvants (Dyne-Amic, Break Through, & Exit) were selected based on Bayer Crop Production Sciences’ recommendations as well as products used commonly in university research trials. Surfactants were combined with the 2 way, systemic insecticide, Movento. Our intent was to increase spray penetration into plant tissue, extend the area of spray coverage and protection without burning fruits. Sprays were administered in November/December 2014.
We utilize a spray volume of 100 gallons / acre and fruit columns were sprayed until run off (Photo 1 & 2).

A total of 3 fruit bunches were used for each treatment. Two young fruit bunches (6 a and 6c) and 1 older fruit bunch (6 b) were selected.
Photos of the fruit column were taken before and ~2 weeks after the initial spray was delivered. Blemishes were noted and highlighted with a permanent pen before sprays were delivered.

Latron (top left photo), Hiwett (bottom left photo), Pure Spray (top right fruit) and Break Through (bottom right photo) had VERY little damage except for some staining at the drip point. The staining appeared insignificant but it was not easily removable with water and rubbing.

Overall, Movento treatments with Ag Aide and Indicator 5 resulted in no to little damage to young and older banana fruit bunches.
Exit (left photo) burned young fruits but did not affect older fruit bunches as drastically (photo on right).

Dyne-Amic caused significant burning to 2 out of the 3 bunches in its treatment.

FIRST TRIAL SUMMARY: Overall, results showed that banana growers may consider incorporating Ag Aide and Indicator 5 into their various pest management spray programs as a general use surfactant for insecticides, fungicides, etc. applications. The combination of Movento with Dyne-Amic and Exit needs to be re-evaluated before a recommendation can be made.

SECOND TRIAL: JANUARY – FEBRUARY 2015

In January 2015, we initiated a second trial to enhance the penetration properties of Movento by lowering the rates of Break Through, Hiwett & Pure Spray in hopes to reduce the phyoto-reaction completely in January 2015. Young fruits appeared to be more sensitive than older fruit bunches. Since growers spray all stages of fruit within the orchard uniformly, we adjusted our methodology and focused on the 3 surfactants with penetrating properties.
We meet with Ed Ishida of Bayer to re-evaluate the rates of application. We lowered the rates of Hiwett (from 4 oz to 1.5 oz / acre), Break Through (6 oz to 3 ounces / acre), and Pure Spray (96 oz to 64 oz / acre). Similar to the first trial, a total of 3 fruit bunches were used for each treatment.

Overall, fruit bunches, with the exception of 1, expressed no phyto-toxicity damage when combined with Movento at a rate of 16 oz/ acre.

A-Breakthrough at 3 fluid ounces / acre; B-Hiwett at 1.5 fluid ounces / acre, and C-Pure Spray at 64 fluid ounces / acre

One of 3 fruit bunches in the Pure Spray treatment showed signs of significant phyto-toxicity spotting. We suspect the phyto-reaction was due to bunch being exposed to the sun, whereas the remaining 2 bunches were located in a shaded area.
SECOND TRIAL SUMMARY

In summary, results from these two replicated, informal field trials demonstrated that banana growers may consider Ag Aide and Indicator 5 as a general use surfactant for pest management applications. To maximize the mode of action of the newly registered product, Movento, penetrating type of adjuvants such as Break Through (3 oz) and Hiwett (1.5 oz) should be used with caution and evaluated at the lowest label rate to minimize phyto-toxicity issues.

The combination of Movento with Pure Spray, Dyne-Amic, Latron and Exit needs to be re-evaluated further before a suggested rates can be made regarding its phyto-toxicity and spread ability potential. Growers are advised to test new combinations on a small area on fields before applying it to the whole area and also be mindful that these trials were conducted in the winter vs summer season when sunlight and temperature may affect results.