אופטימיזציה של פעילות האבקה של הדבורים באמצעות שילוב תרכיזי UV מתקדמים ביריעות חקלאיות

חנה שוורץ
מנהלת פיתוח וטכנולוגיה, כפרית ישראל

Field Trials:
sulfur resistant
UV stabilized
greenhouse films
and pollinators behavior


How to avoid premature degradation?
How to develop a film with long lasting properties?

PESTICIDE TREATMENT

Higher and more aggressive elemental Sulfur treatment : S^0

- efficient fungicide
- “environmentally friendly”
- allowed in organic farming and integrated pest management (IPM)

POWDERY MILDEW IN ROSES

FIELD TRIALS
SULFUR RESISTANT GREENHOUSE FILMS

Objectives:

The comparative study of different light stabilizer systems for GH films subjected to sulfur treatment on field trials

Evaluation of UV absorber impact on GH films stability

Experimental:

Three (3) and five (5) layers, 180 Micron greenhouse films

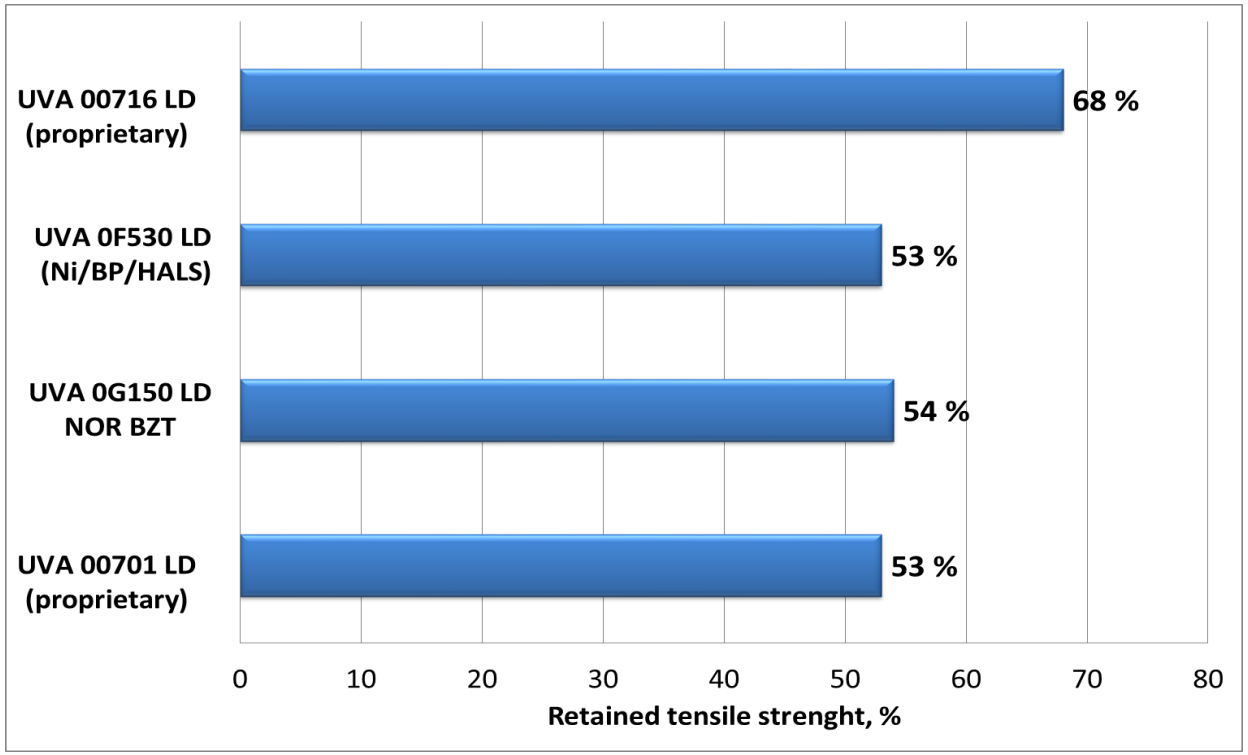
Polymers: LL/LD/EVA, Additives: IR, AF, AntiDust

UV MBs were designed for 3 years of service life

Up to 3000 ppm of S (180 micron)

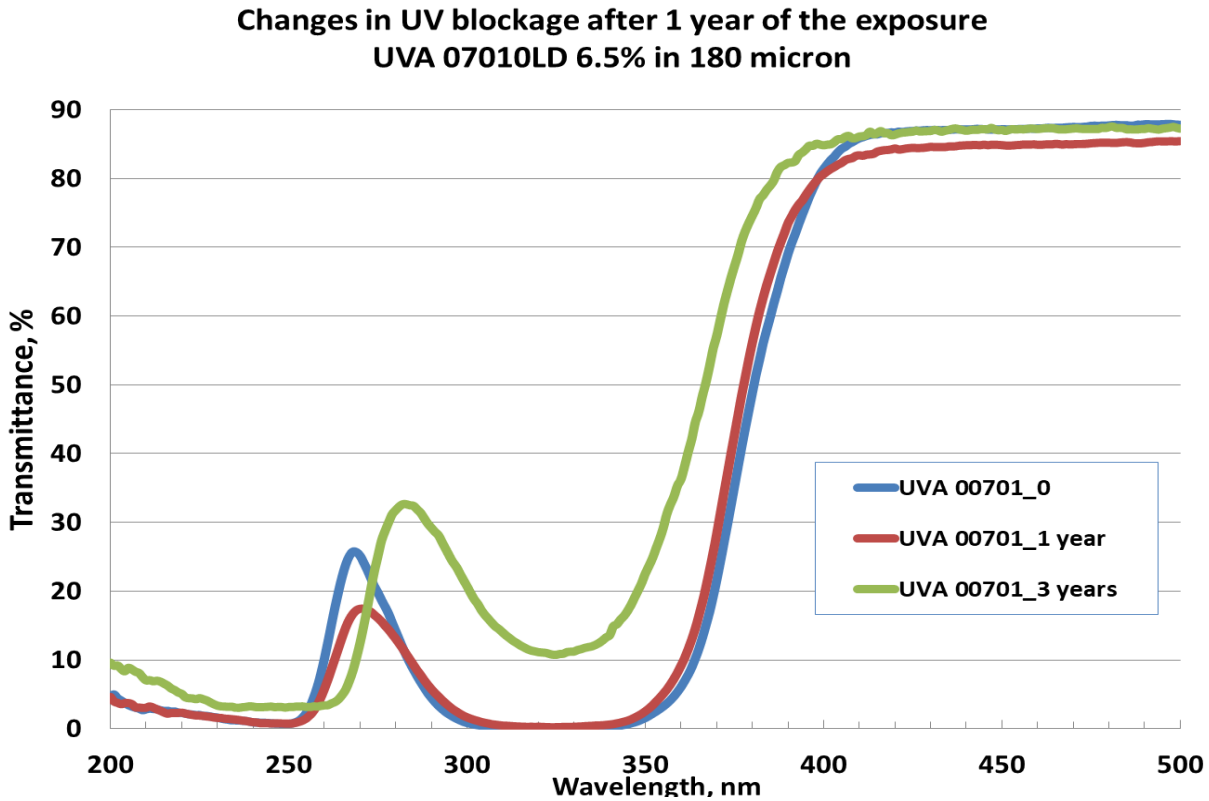
Target criteria: 50% retained elongation.

FIELD TRIALS WITH ROSES AND PEPPERS GROWERS



- Excellent sulfur resistance of UVA 00701 LD, as standard NOR based solution (UVA 0G150 LD)
- Superior performance of UVA 07160 LD compares to standard NOR and Ni based solutions. 70% retained strength after 36 months at the field. 3000 ppm S

PERSISTENT UV ABSORPTION WITH UVA 07010 LD



UVA 00701 LD still active blocking 70% UV even after 3 years

3000 ppm S, 160 kLy/year

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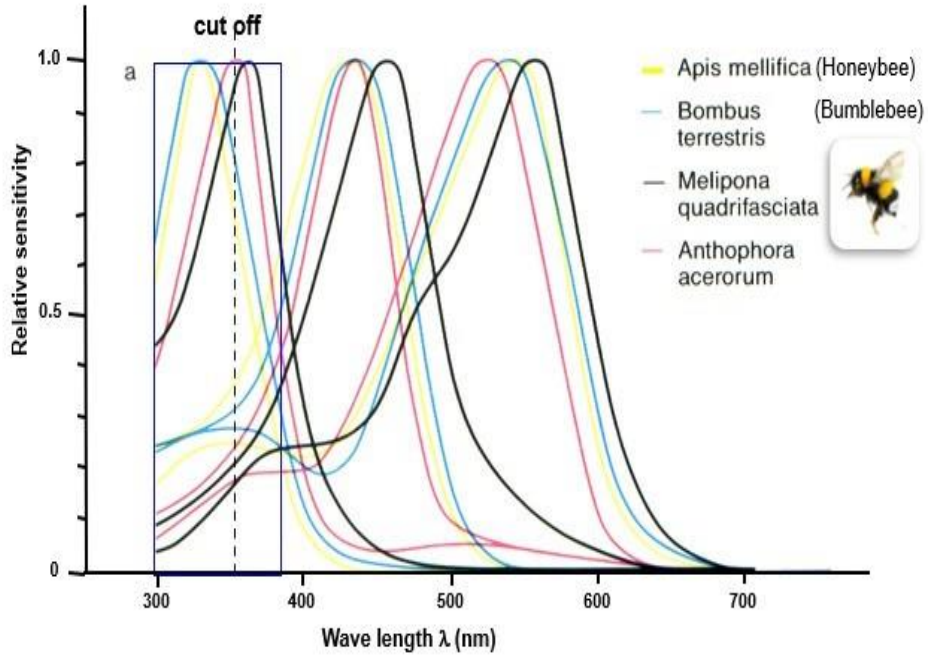
INFLUENCE OF UV STABILIZED GREENHOUSE FILM ON BEES POLLINATION ACTIVITY

Van Der Blom, J. (2010). Applied entomology in Spanish greenhouse horticulture. Proc. Netherland Entomos. Soc. Meet. 21, 9–17.



Hempel de Ibarra, N., Vorobyev, M.V., Menzel, R.(2014) Mechanisms, functions and ecology of color vision in the honeybee. J. Comp. Physiol. A 200, 411-413

What is the influence of long lasting , sulfur resistant greenhouse films on pollinators behavior?

TRIALS EXPERIMENTAL SET UP AND PARTNERS

Our partners:

Bsor experimental station at Southern part of Israel
Cooperation with Prof. Arnon Dag research group ,
Volcani center (ARO-Agricaltural research organization)

Experimental set up:
8 sulfur resistant UV MB formulations (HALS & UV Absorber)
16 greenhouses (GH): 6 X 10 X 20 m
Crop: Melon
5 rows of melon plants per GH
Pollinators: honeybees) Apis mellifera)

Planting: 1st March 2022 Planting: 15th October 2022

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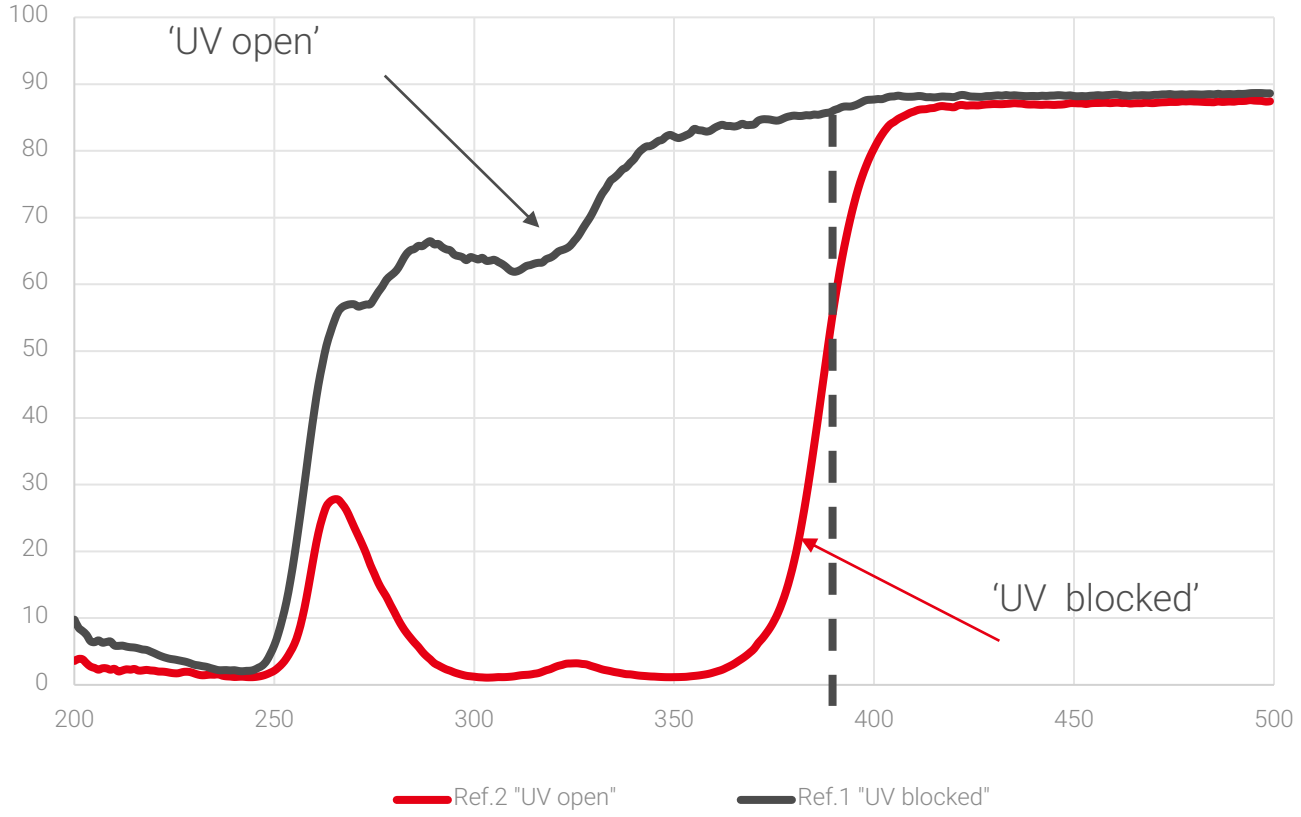
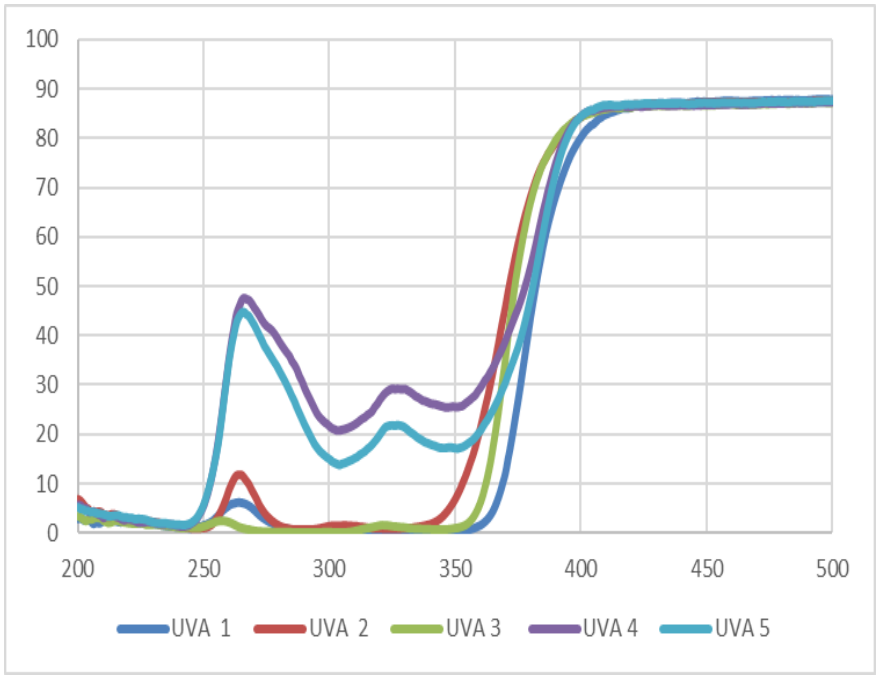
UV VIS TRANSMITTANCE SPECTRUM OF THE EVALUATED FILMS

"Positive" and "Negative" reference films spectrum

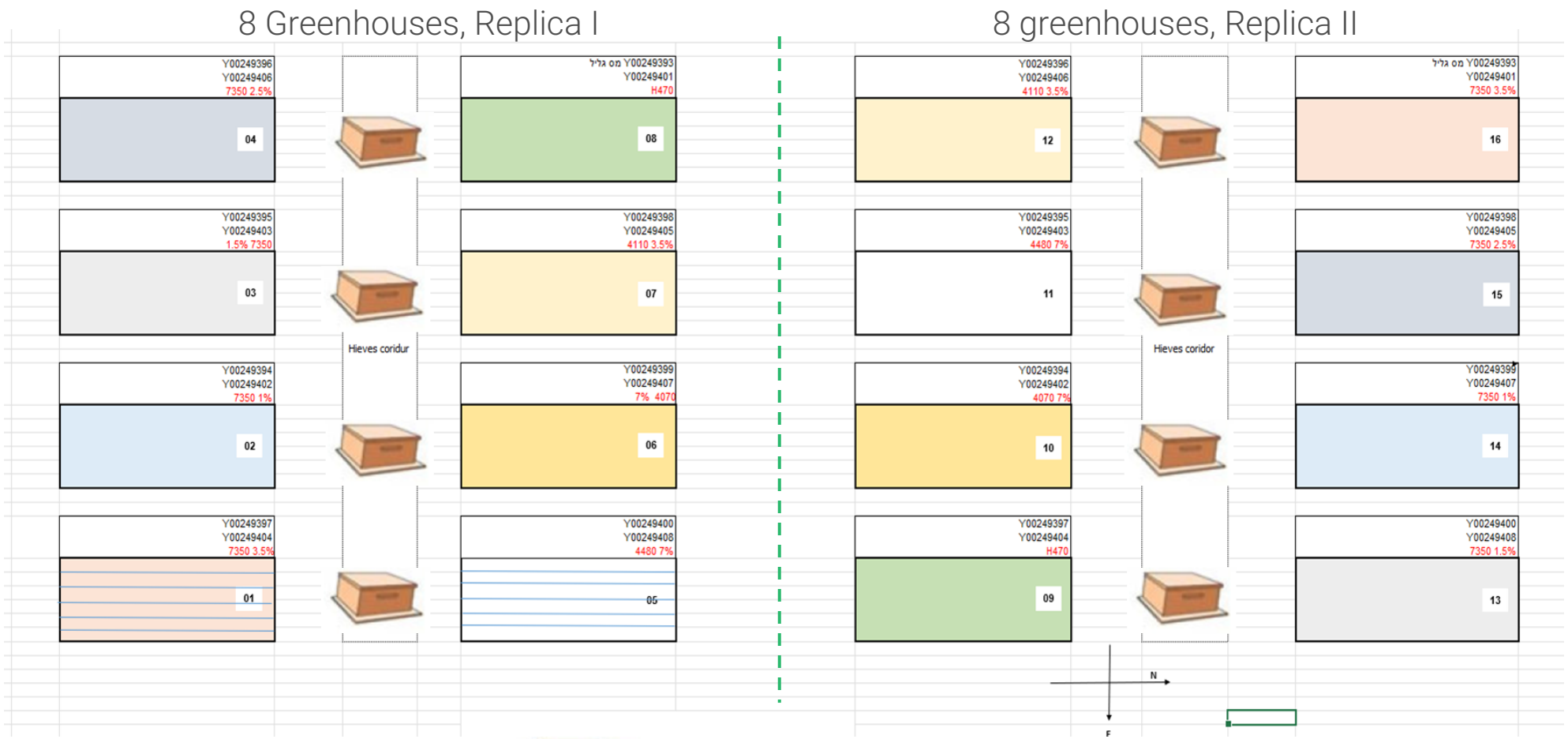


Spectrum of studied films:



LARGE SCALE FIELD EXPERIMENT:

EVALUATION OF BEE POLLINATION BEHAVIOR UNDER SULFUR RESISTANT UVA FILM



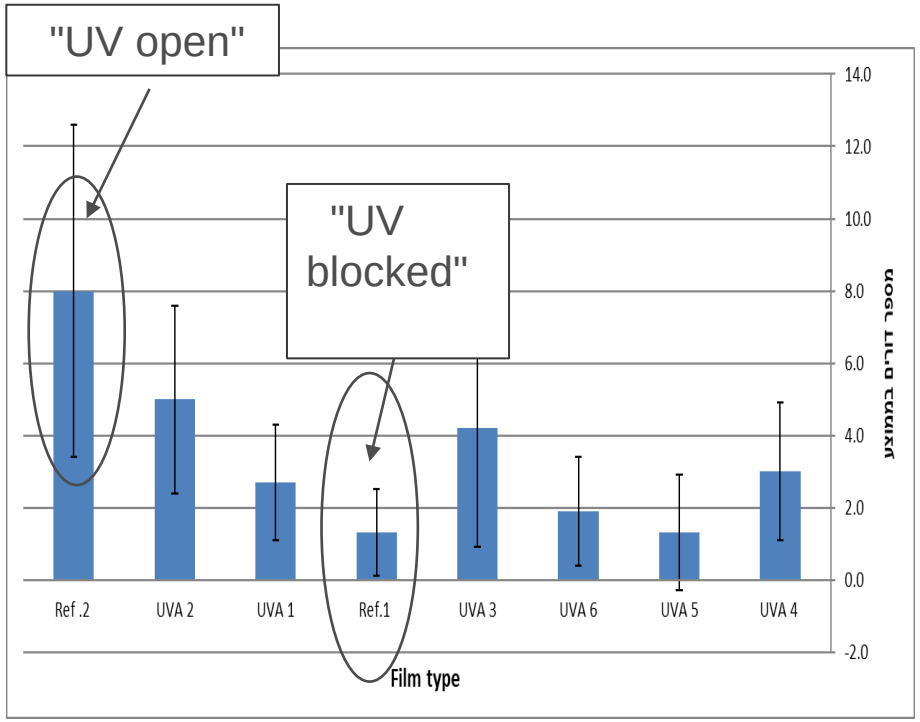
POLINATION ACTIVITY EVALUATION: BEES COUNTING

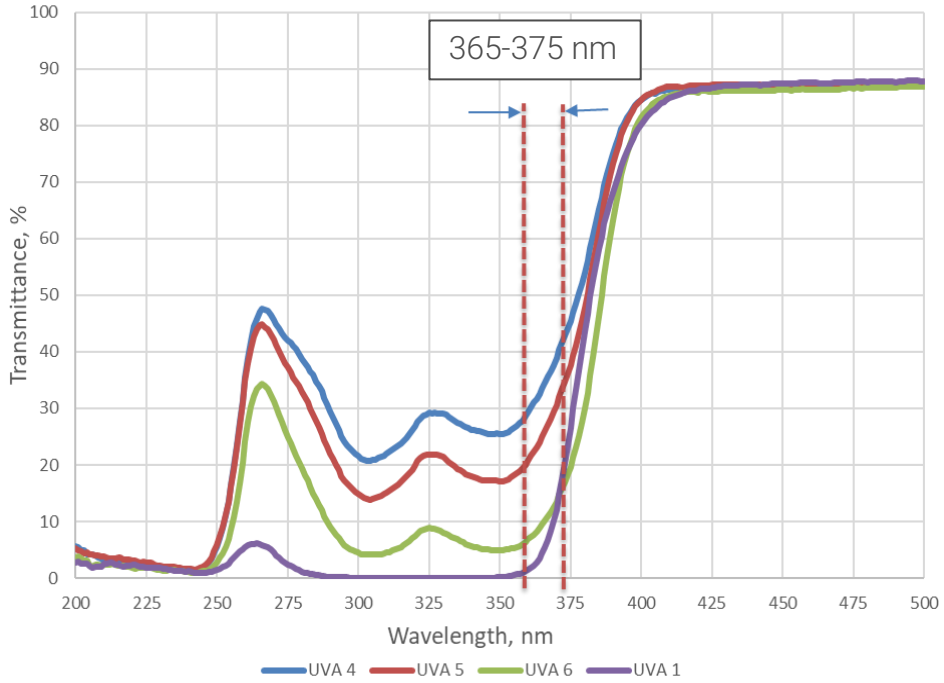
Honeybee pollinating melon flower

Bee counting : 5 days, 3 counters, two counting rounds

60 counts per UV formulation / greenhouse

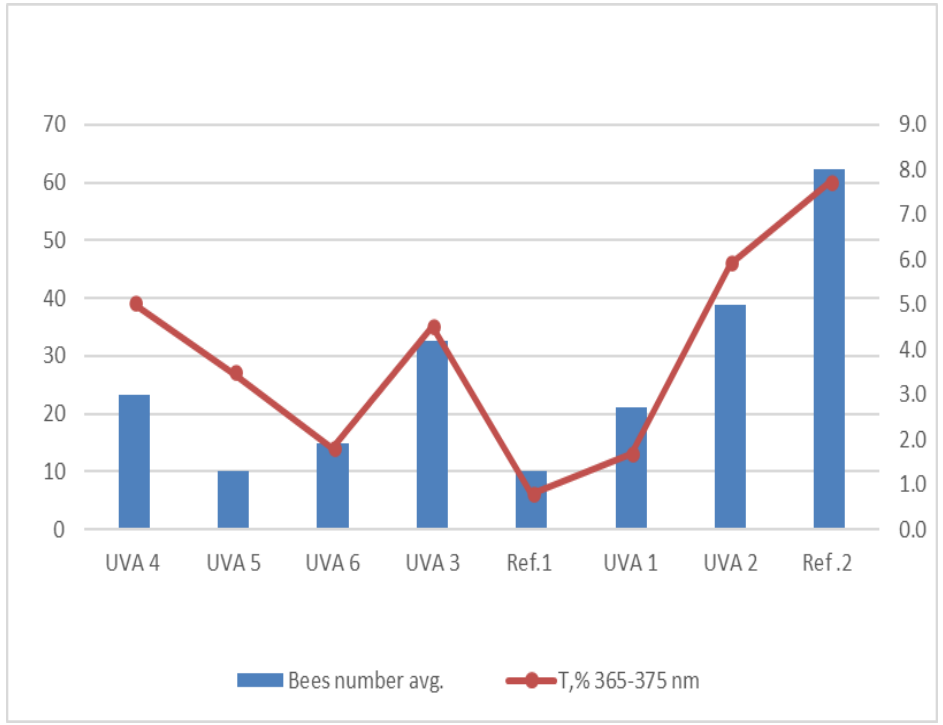
HONEYBEE FORAGING ACTIVITY:
DAILY AVERAGE NUMBER OF BEES VS. UV VIS TRANSMITTANCE

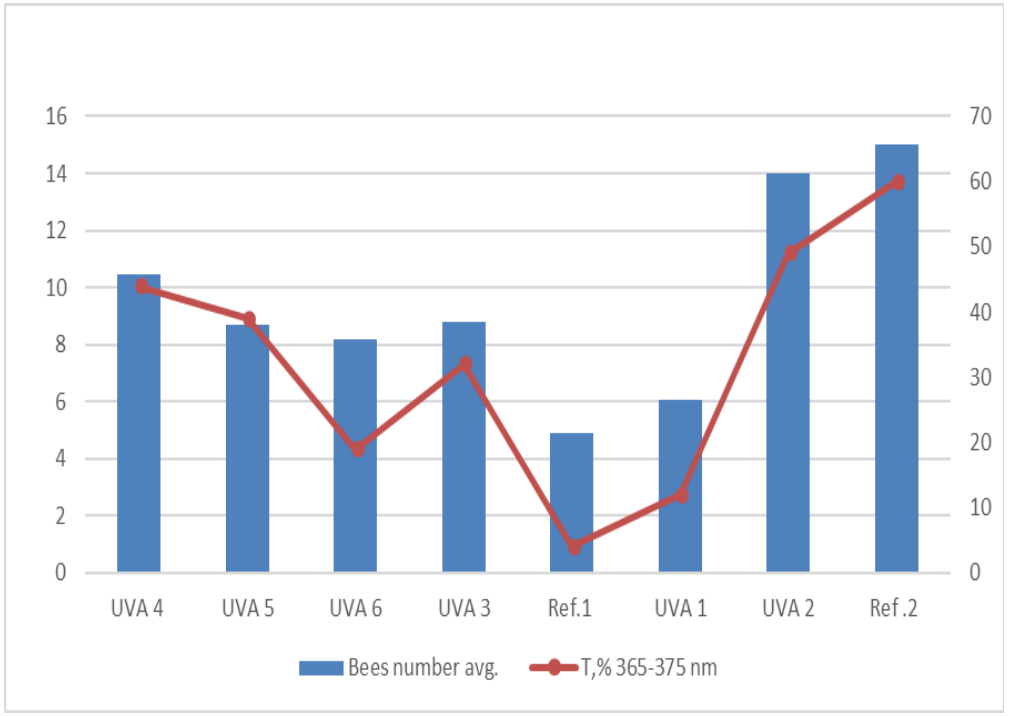




- In this study Honeybees pollination activity is strongly affected by greenhouse film spectrum
- There is correlation between % of UV light transmission & pollination activity

CORRELATION BETWEEN UV TRANSMITTANCE (365-375 NM) AND POLLINATION. SPRING & ATUMN TRIALS.





Good Correlation between UV transmittance in **365-375 nm** and bee pollination was found.
Minimal transmittance – 35%

YIELD: WEIGHT OF FRUITS (IN KG) PER GREENHOUSE. SPRING/AUTUMN DATA

Film Type	Bee visits	Yield, kg
Ref.2	18.55	**572**
UVA 2	17.64	**561**
UVA 4	12.6	540
UVA 3	10.8	509
UVA 1	10.26	**601**
UVA 5	8.2	507
UVA 6	7	497
Ref.1	6	501

SUMMARY & CONCLUSIONS

Development of new UV stabilizers Masterbatches for greenhouses films requires extensive studies

The new solutions offered by Kafrit are approved by multiple stage process: accelerated weathering, filed trials at R&D experimental farm and with films producers

The new solutions are evaluated with “state of the art” solutions at the market

Different aspects of UV stabilization formulations on agroecosystem are also investigated, for instance influence on pollinators activity

Very good correlation was found between pollination bee activity measured as number of bees visits and UV vis transmittance of the film in the range between 365- 375 nm

First best pollination activity (closest to positive reference) was observed for the film compounded with UVA 2, UVA 4 and UVA 3 , with the transmittance of 50%, 39%and 35% in 365-375 nm

Ref.2 (UV open)	UV 00H470 LD
UVA 2	UVA 03750 LD
UVA 4	UVA 07920 LD
UVA 3	UVA 07170 LD

Hanna Schwartz

Development & Technical Services Manager

Phone: +972-8-6809597
Mobile: +972-50-7891726
Mail: hanna@kafrit.co.il