Influence of KF bio-stimulants on quality and yield of Mango

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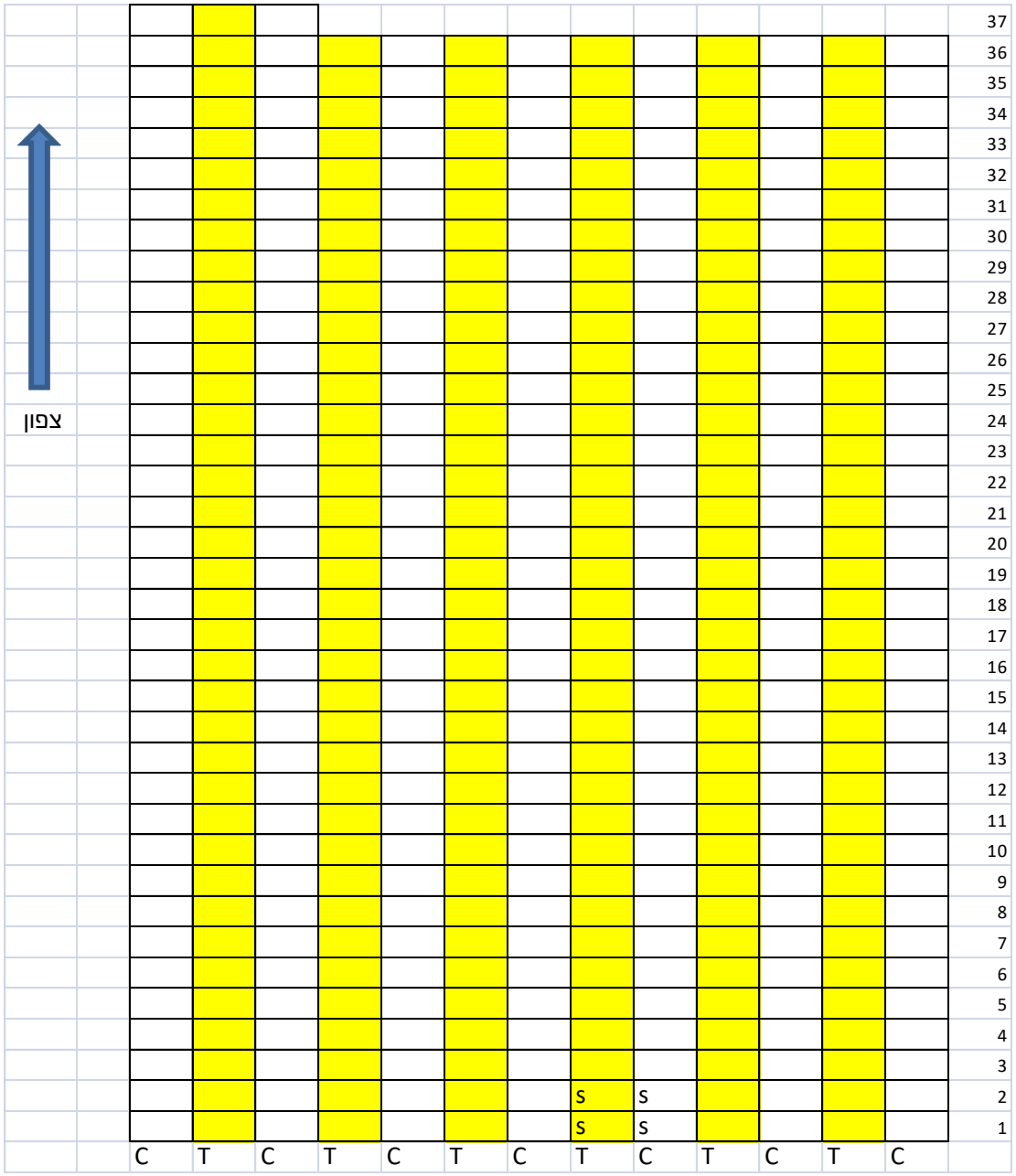
In the years 2016 – 2017 VGI Israel conducted a trail to test the influence of the KF 10 and KF AMINO bio- stimulants on the yields and quality of Kent variety Mango. The trial was held in a commercial orchard in northern Israel. Trees that received the grower's standard treatments were the control group. The treatment group was trees that received treatments with KF according to VGI's protocols (see next page) in addition to the grower's standard treatments. The following chart demonstrates the structure of the trial plot:



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KF - טבעי שזה עובד

Treatment Protocol:

The trial treatment protocol was designed according to VGI's "Embryo Nutrition" concept. The concept signifies the importance of improved nutrition and stimulation of plant cells at times of increased metabolic processes and cell divisions in the root, plant and fruit tissues. The KF 10 is applied to the root zone through drip irrigation and by foliar spray. The KF AMINO is applied by foliar spray.

The protocol:

1. Post harvest application: KF 10 through irrigation, 10-15 L/ha.
2. Early flowering application: KF 10 through irrigation, 10 L/ha.
3. Post fruit set: between fruit set to the hardening of the fruit stone, 30 L/ha through irrigation, divided to 3 – 12 applications
4. Pre Harvest: 21 days prior to harvest, foliar spray of KF 10 5 L/ha+ KF AMINO 5 L/ha.

The trail treatments are specified in the following chart:

Date	Material	Dose L/Ha	App. Method	Remarks
10/3/2016	KF 10	L 15	Drip irrigation	Early flowering
18/4/2016	KF 10	L 10	Drip irrigation	Post fruit set
11/5/2016	KF 10	L 10	Drip irrigation	
22/5/2016	KF 10	L 10	Drip irrigation	
*11.7.2016	KF 10+KF AMINO	5 + 5	Foliar Spray	Harvest on 19/7/2016
30/8/2016	KF 10	10	Drip irrigation	Post Harvest
7/3/2017	KF 10	10	Drip irrigation	Early flowering
6/4/2017	KF 10	10	Drip irrigation	6.4.2017
8/5/2017	KF 10	10	Drip irrigation	8.5.2017
6/6/2017	KF 10	10	Drip irrigation	6.6.2017
15/7/2017	KF 10+KF AMINO	5+5	Foliar spray	15.7.2017

- The spray in 2016 was preformed few days before harvest. The timing of the harvest was set due to commercial reasons, and could not had been predicted at the time of the spray.

Findings:

2016 Harvest:

At the time of the commercial harvest of 2016, 4 trees out of 4 treatment intervals and 4 trees out of 4 control intervals were checked for number of fruits per tree, fruit weight per tree, fruit weight per interval and average weight per single fruit. No clear differences were detected between treatment and control for those parameters.

Out of each interval a sample of fruits were taken to laboratory tests. Results as follows:

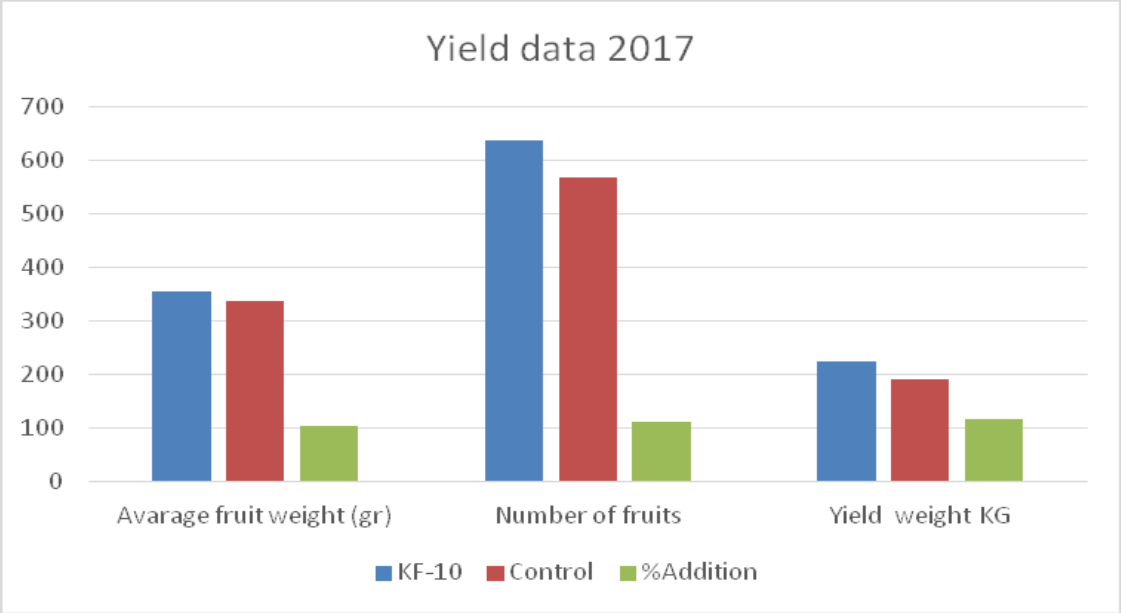
Firmness:
Treated = 56 IQ
Control= 55.8 IO
Acid (Malic):
Treated = 0.8%
Control= 0.9%
TSS:
Treated: 7.5%
Control: 7%
Difference statistically significant (p=0.009)
Green skin color (a value)
Treated: -12.4
Control: -13.4
Difference statistically significant (p=0.005)

Summary: TSS values and green skin color values indicate that the treated fruit was riper than the control at the time of harvest.

2017 Harvest:

On 23.7.2017 3 trees out of 4 trial and 4 control intervals were marked. At the day of the harvest (6/8/2017) fruit of those trees was picked separately from the commercial harvest. In each interval number of fruits and fruit weight were measured. Findings are specified in the following chart:

Av. Per interval	Total	T4	T3	T2	T1	Treatment intervals
225.55	902.20	232.00	208.30	264.80	197.10	Total fruit weight
635.5	2542.0	640.0	560.0	694.0	648.0	Number of fruits
0.36	1.42	0.36	0.37	0.38	0.30	Average fruit weight
Av. Per interval	**Total**	**C4**	**C3**	**C2**	**C1**	**Control intervals**
192.29	769.17	187.31	226.70	228.64	126.52	Total fruit weight
568.25	2273.00	590.00	672.00	620.00	391.00	Number of fruits
0.34	1.35	0.32	0.34	0.37	0.32	Average fruit weight



The following trends appear in the yield data from 2017 harvest:

- 17.3% increase in the total yield per interval.
- 11.8% increase in the number of fruits per interval.
- 5.4% increase in the average fruit weight.

In 2017 fruit samples from each interval were taken for laboratory tests, that included:

- % of weight loss after 21 days in cool storage.
- Fruit firmness at reception and after 21 days in cool storage.
- TSS values at reception and after 21 days in cool storage.
- Color of skin and internal flesh at reception and after 21 days in cool storage.

The following trends and findings were detected by the laboratory tests:

1. At time of reception (=harvest day) the precentage of the “Red Cheack” cover of the treated fruits were significantly higher than the control ($p<0.05$).
2. At time of reception, treated fruits showed higher values of Firmness, TSS and internal flesh color. These tendencies were not significant.
3. After 21 days in storage, treated fruits were significantly firmer, and with stronger color ($p<0.05$).
4. Weight loss after 21 days in storage was significanlly lower for treated fruit (1.9% loss in the treatment Vs 2.9% loss in control).
5. After 21 days in storage there were no significant differences in the TSS and internal color values between the treatment and the control fruits.

Control fruits after 21 days in storage.




Treatment fruits after 21 days in storage:




Summary:

The findings of this work show that treatments with KF 10 and KF AMINO according to the protocol recommended by VGI Israel, contributes to yield increase and for better quality of Mango from Kent Variety. The contribution of the treatment to the fruit quality parameters was apparent within the first season on the treatments. The contribution to the fruit yield that was received in the second season is a result of higher number of fruits and increased fruit weight. The percentage of fruit number increase in much higher than the percentage of weight addition (11.8% vs 5.4%). Therefore, the added yield is mainly a result of higher number of fruits per tree. This may indicate a positive influence of the treatment on the trees at the times of fruit formation, fruit set and fruit growth. This may also be a result of lower rates of fruit fall between fruit set and stone hardening.

The laboratory findings indicate that the treatment accelerates ripening process, and improves important features of fruit quality: Color and firmness. The fact that the weight loss after 21 days of storage was significantly lower in the treated fruit may have significant and positive effect on the economy of this crop.

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