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Effect of potassium foliar spray on two plum trees cultivars : «Strival» and «Black Star»

Ghannem M., **M. Ben Mimoun** and B. Jraidi

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Introduction

- In Tunisia, plums industry occupies an area of 6,500 ha.
- The production is around 15000 tons / year.
- More than 90% Japanese plums
- 40% of the area is irrigated, producing 75% of the national plum production (11000T)

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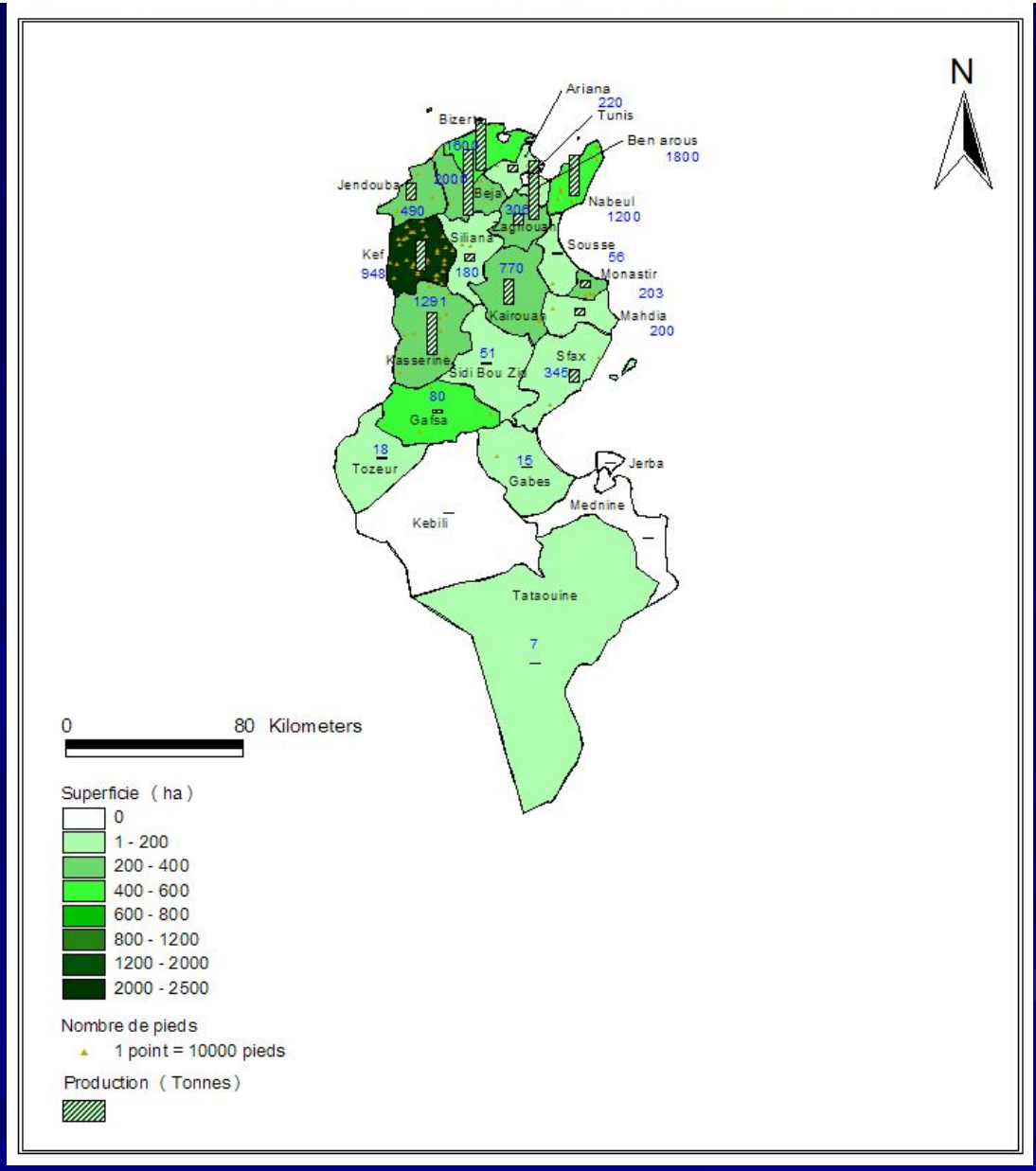

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- Potassium is a major element with an important effect on fruit yield and quality.
- One of its functions is to activate enzymes and help to maintain turgor controlling the opening and closing of stomates.
- Potassium uptake appears to be proportional to vegetative growth, reaching its maximum in early summer.
- Potassium accumulates substantially in fruit tissues and have a role in fruit growth and quality.

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- Potassium in tree, is mobile, readily moving in and out of cells and from one part of the tree to another.
- Potassium is easily adsorbed and distributed trough leaf tissues.
- Potassium could be applied with different methods.
- The foliar application is helpful to satisfy plant requirement and has a high efficiency.

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Objectives

- This work aims to study the effect of foliar potassium fertilization
  - vegetative growth,
  - Plum fruit quality
  - leaf mineral content.

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Material and Methods

- The experiment was carried in a grower's orchard in M'hamdia (30 km south of Tunis)
- Two varieties were used
  - Strival
  - Black Star
- Trees 5*3m, grafted on Mariana rootstocks are 15 years olds and conducted on open vase
- The orchard is drip irrigated and receive all the technical cares for commercial production.

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Material and Methods

- At the beginning of the season, an estimation of potassium requirement was made based on the expected yield and the pruning wood.
  - Strival
    - Expected yield : 25 T/ ha
    - Required K_2O : 77 kg/ ha
  - Black Star
    - Expected yield : 35 T/ ha
    - Required K_2O : 102 kg/ ha
- The fertilizer used was a soluble form of potassium sulphate (K_2SO_4) for fertigation and foliar spray.

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Treatments	Method	Quantity
Control		
F50	Foliar spray	50% of tree requirement
F100	Foliar spray	100% of tree requirement

- Three blocs of three single tree replications of each treatment were used.
- Foliar fertilization were applied three times using a 10l sprayer
  - May 1st 2006
  - May 19th 2006
  - June 1st 2006

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Material and Methods

- The vegetative growth and fruit diameter were measured every 15 days until harvest
- At harvest the fruit quality was determined
- Leaf samples were taken during mid July for mineral analysis.

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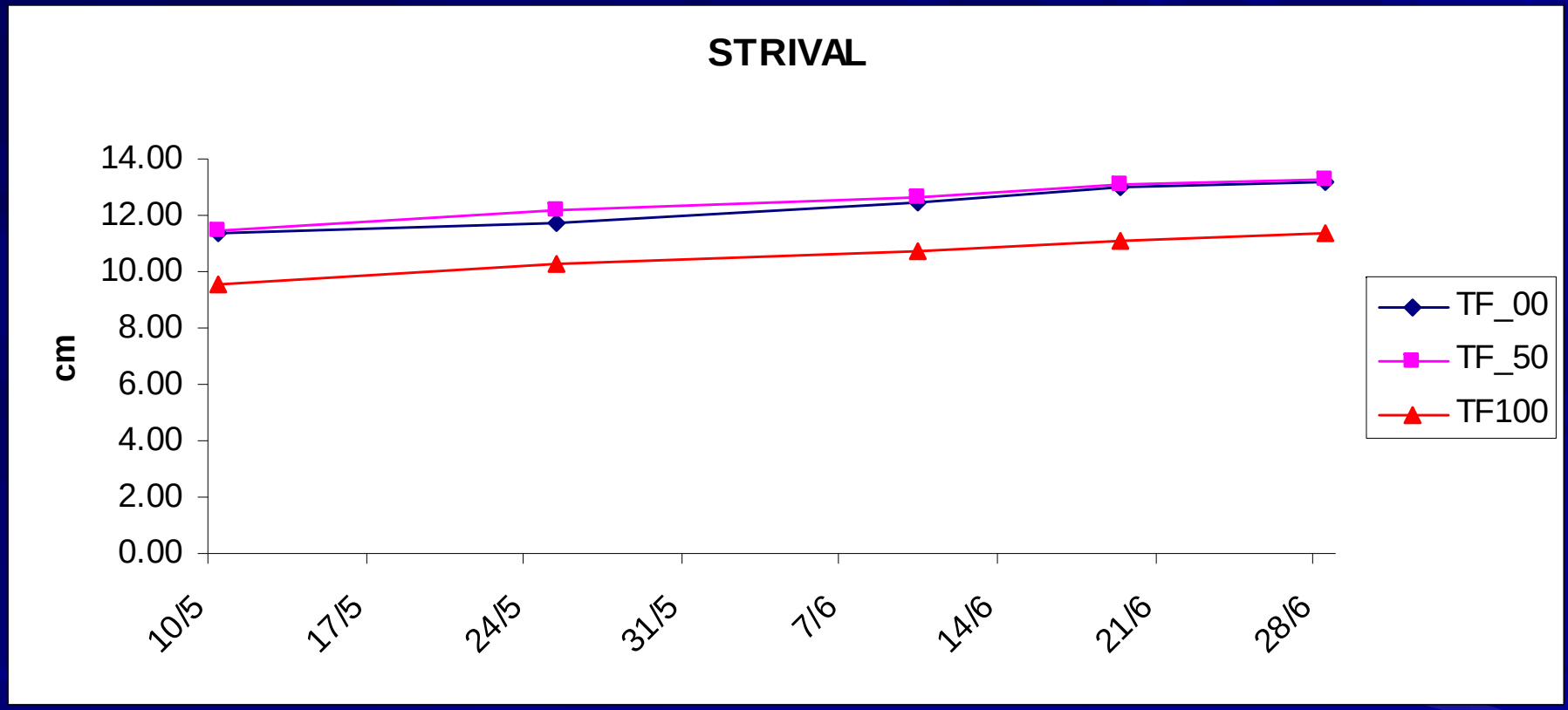
Results



- The vegetative growth shows no significant differences

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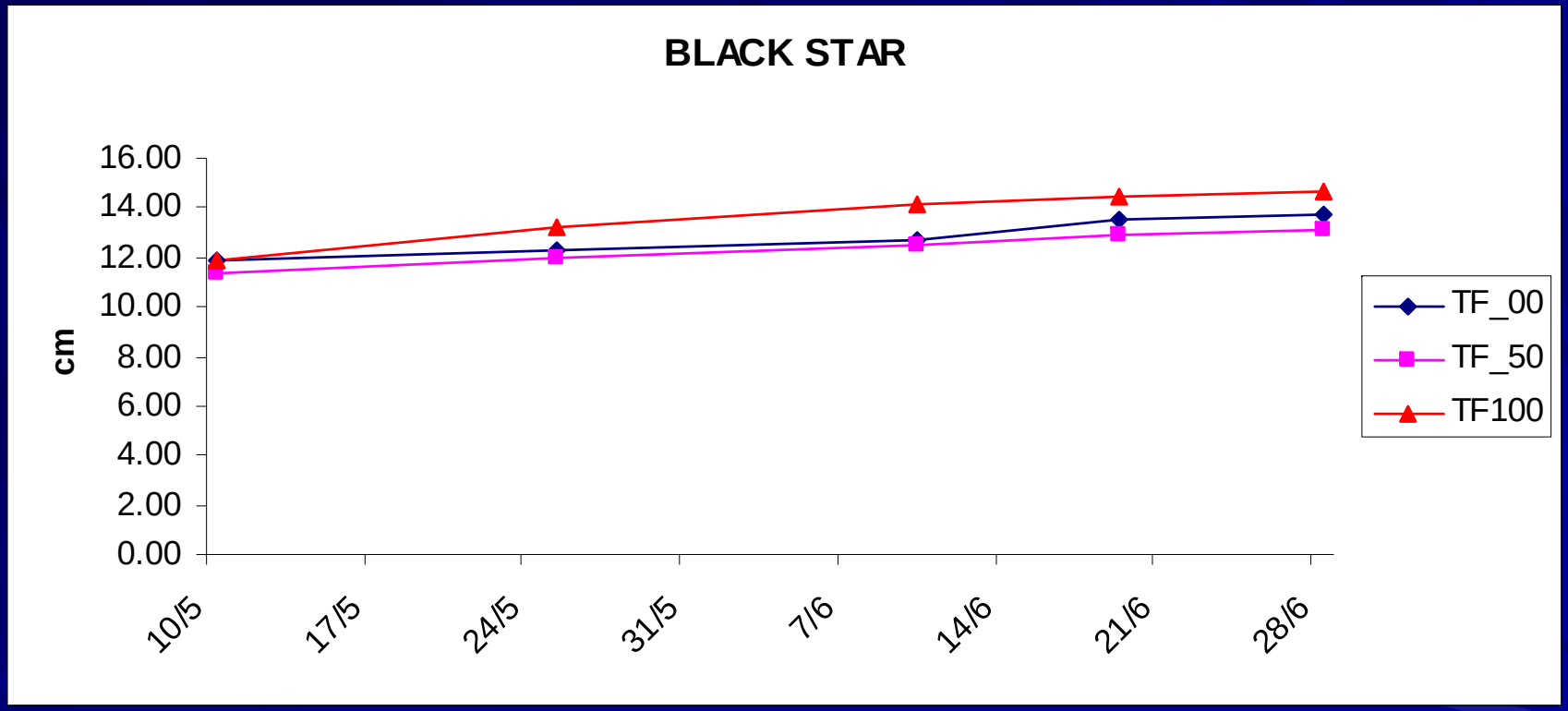

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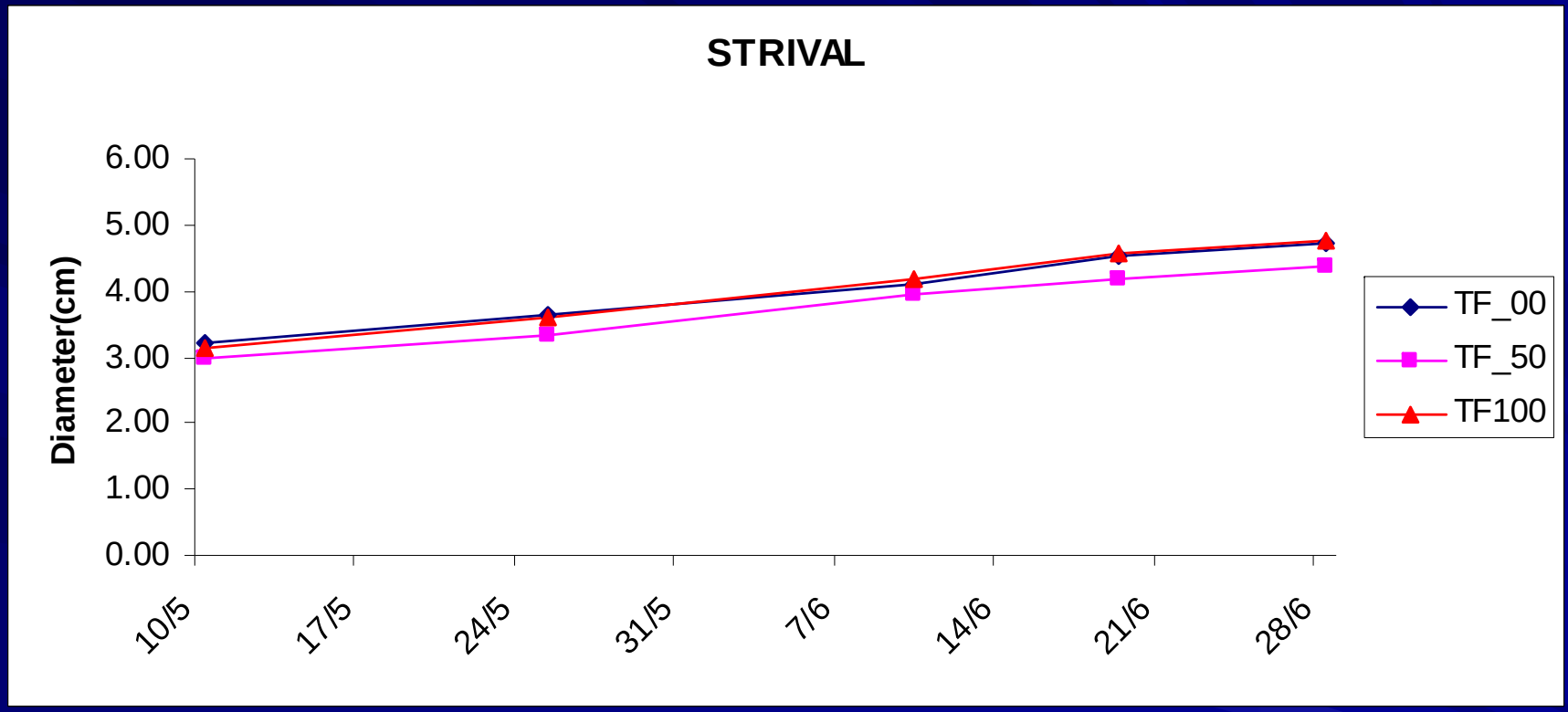
Fruit diameter



- No statistical significant effect was observed.

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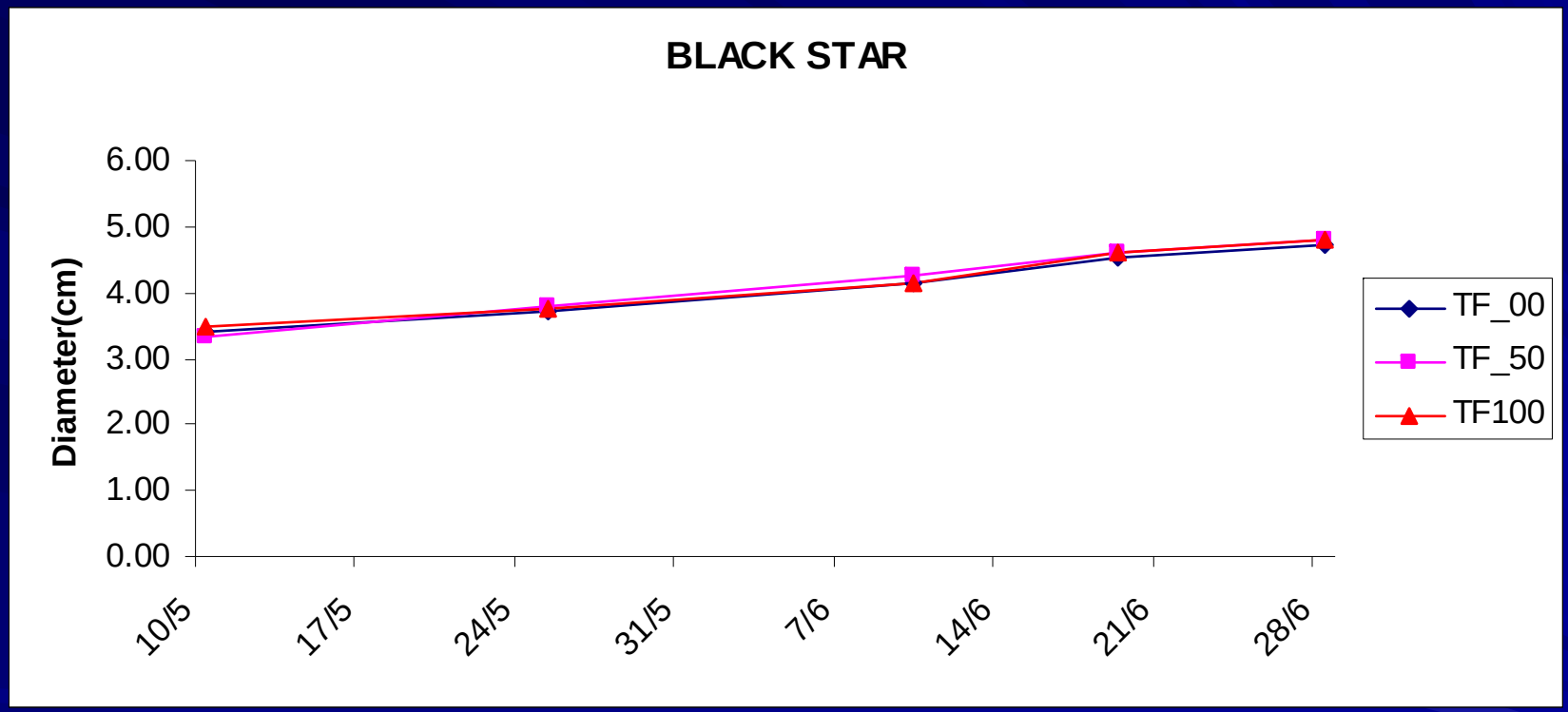

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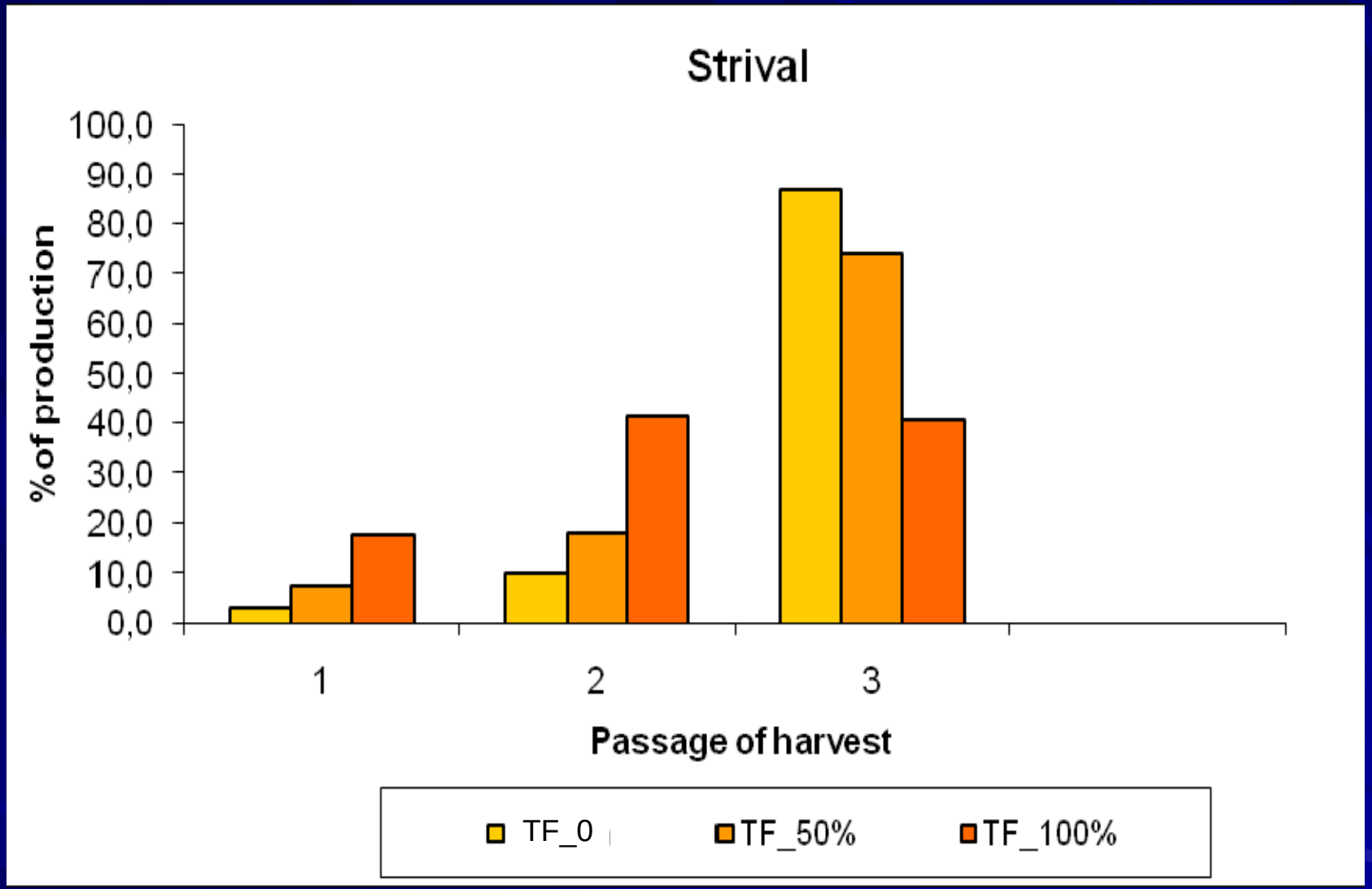

- Fruit ripen earlier with foliar fertilization.

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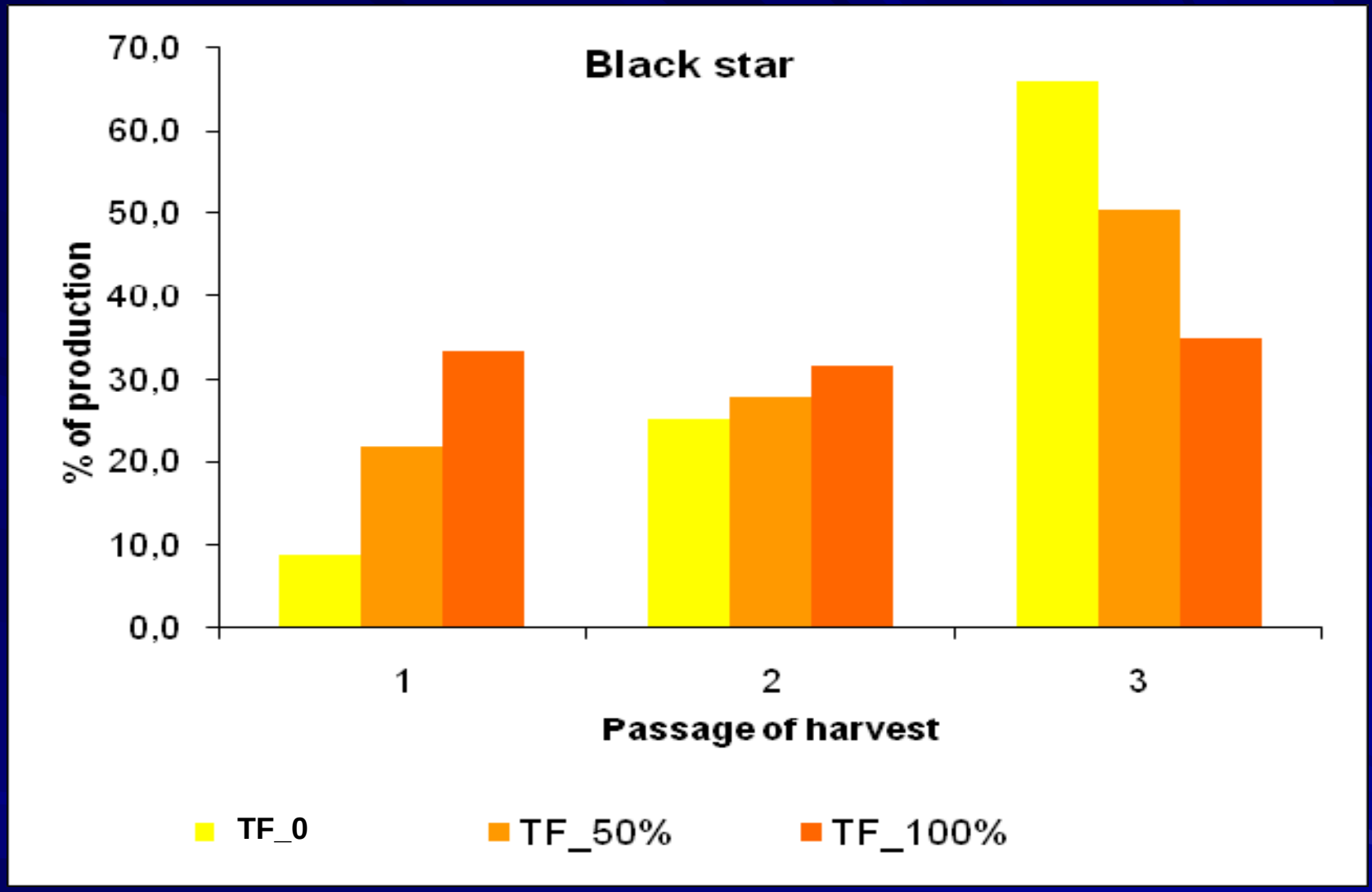

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Fruit weight

	Treatments	1 harvest	2 harvest	3 harvest
Strival	TF00	68.8 b	62.5a	62.4a
	TF50	62.7a	74.9 c	63.7 a
	TF100	75.7 c	64.5 b	70.4 b
Black Star	TF00	82.2a	79.1 a	72.4a
	TF50	92.1 b	100.4 c	83.6 c
	TF100	106.6 c	94.4 b	74.9 b

- A higher fruit weight with foliar potassium spraying

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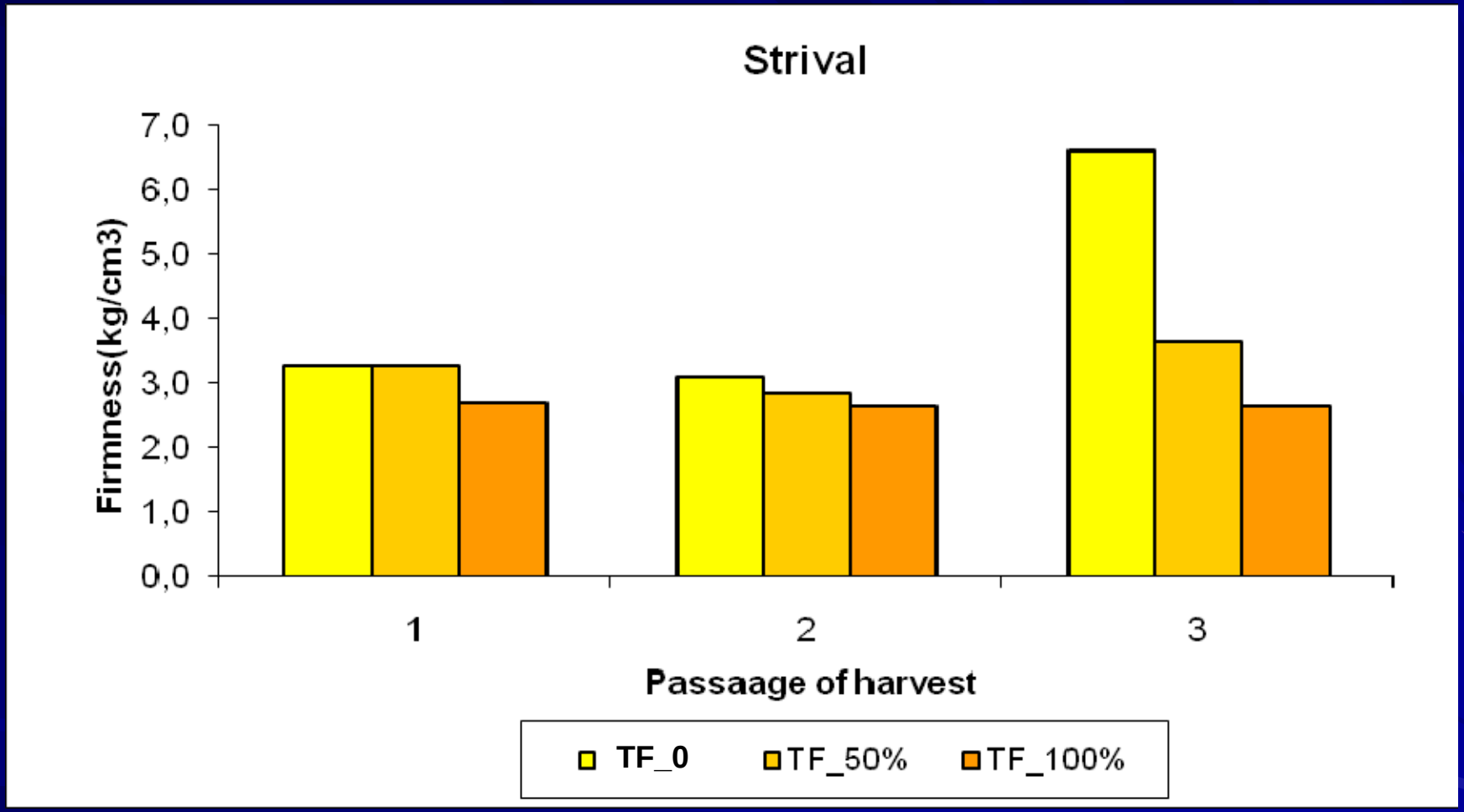
Fruit firmness



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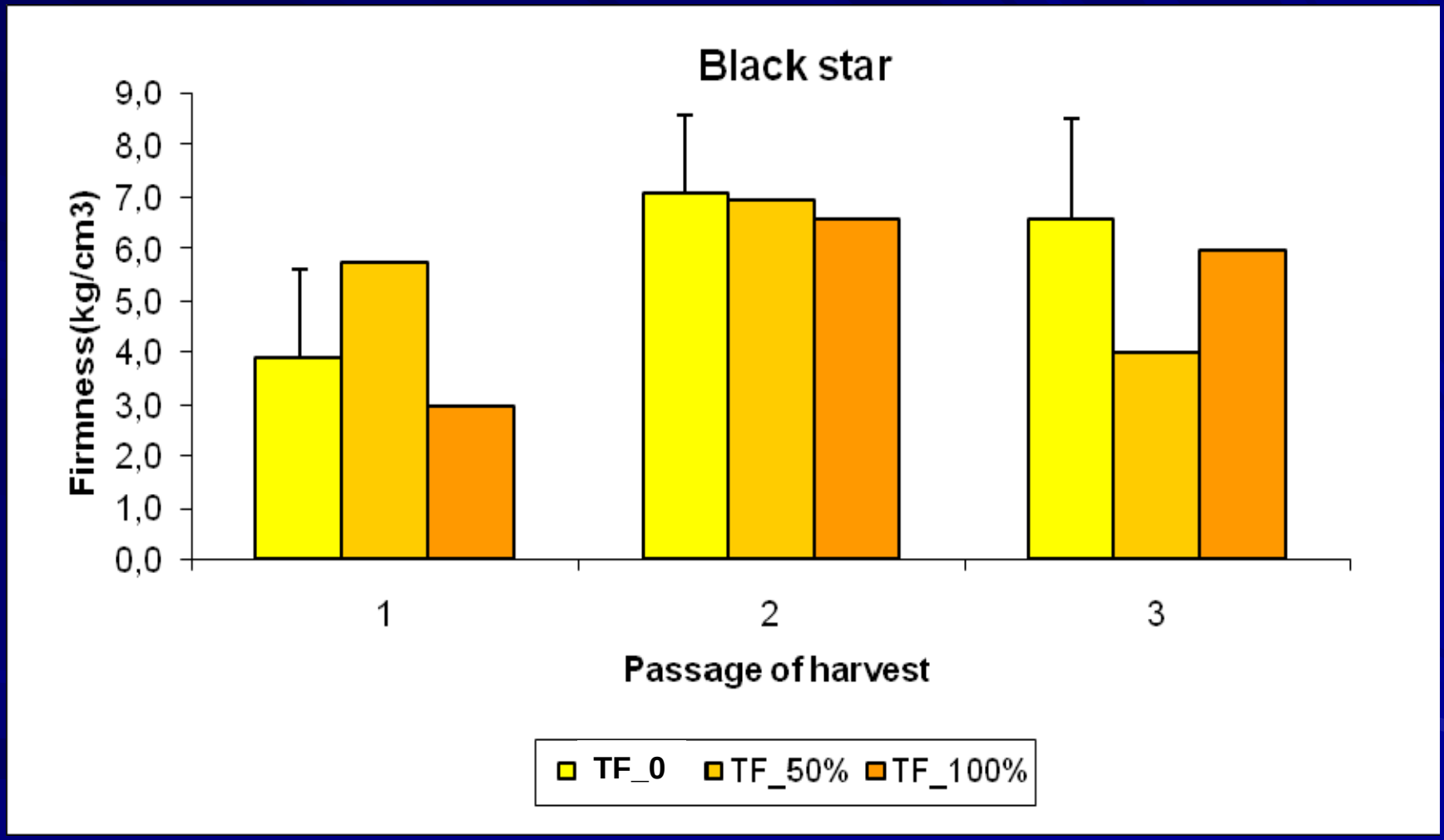

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Strival Fruit Quality

harvest	Treatments	°Brix
1	TF00	11.1
	TF50	12.0
	TF100	12.0
2	TF00	12.1
	TF50	13.1
	TF100	13.0
3	TF00	12.0
	TF50	13.5
	TF100	14.0

- A higher soluble solids percent with foliar potassium spraying

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Black Star Fruit Quality

harvest	Treatments	°Brix
1	TF00	13.5
	TF50	15.0
	TF100	15.0
2	TF00	14.0
	TF50	14.0
	TF100	15.0
3	TF00	15.2
	TF50	15.0
	TF100	14.0

- A higher soluble solids percent with foliar potassium spraying specially with the two first harvests

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Leaf Analysis

	Treatments	N	P	K
Optimum range		2.3-2.6	0.1-0.3	Over 1.1
Strival	TF00	2.20	0.12	3.21
	TF50	2.54	0.11	3.15
	TF100	2.66	0.10	3.17
Black Star	TF00	2.22	0.10	3.15
	TF50	2.33	0.10	3.31
	TF100	2.60	0.11	3.20

- No mineral leaf content differences were observed
- A high potassium leaf content

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Conclusion

- During this first year of the experiments:
  - No effect on vegetative growth
  - The two foliar potassium treatments led to an improvement of the fruit weight and an earlier ripening.
  - The foliar spray induced a higher solid content in fruit.

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