

MANGO TREE RESPONSE TO DEFICIT IRRIGATION AT DIFFERENT PHENOLOGICAL STAGES

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PRIMARY RESEARCH OBJECTIVE

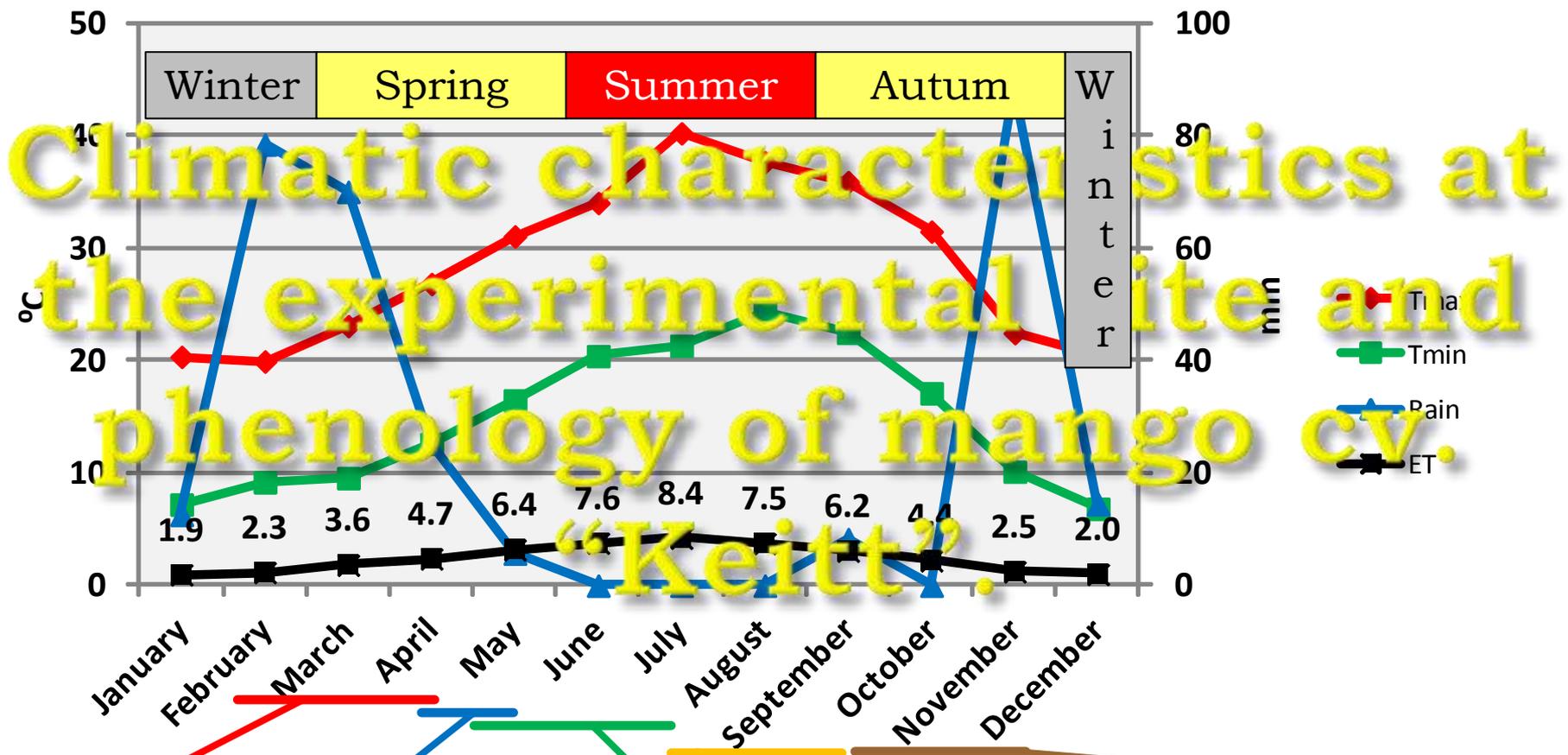
- The objective of this research is to evaluate the effect of deficient irrigation on fruit quantity and quality of late cultivar mango ('Keitt'), drip irrigated and under semi-arid conditions, in order to maximize irrigation use efficiency (IUE).

SECONDARY OBJECTIVE

- To build a tree response curve to different water application levels at different phenological stages.

MAIN RESEARCH ASSUMPTIONS

- It is generally accepted that in many fruit crops the most sensitive phenological periods to drought conditions are fruit set and first fruit growing period (maximum rate of fruit growth by cell division). Such assumptions are relevant for our case, mango cv. Keitt, under Israeli growing conditions.
- It is also assumed among Mango growers that water saving, if necessary, should be done mainly after harvesting, when there is no fruit on the trees.



Flowering



Fruit set



**fruit set-pit hardening
"A": 18.5-6.7**



**Pit hardening-harvesting
"B": 7.7-13.9**

**Post Harvest
"C"
14.9-
2.11**



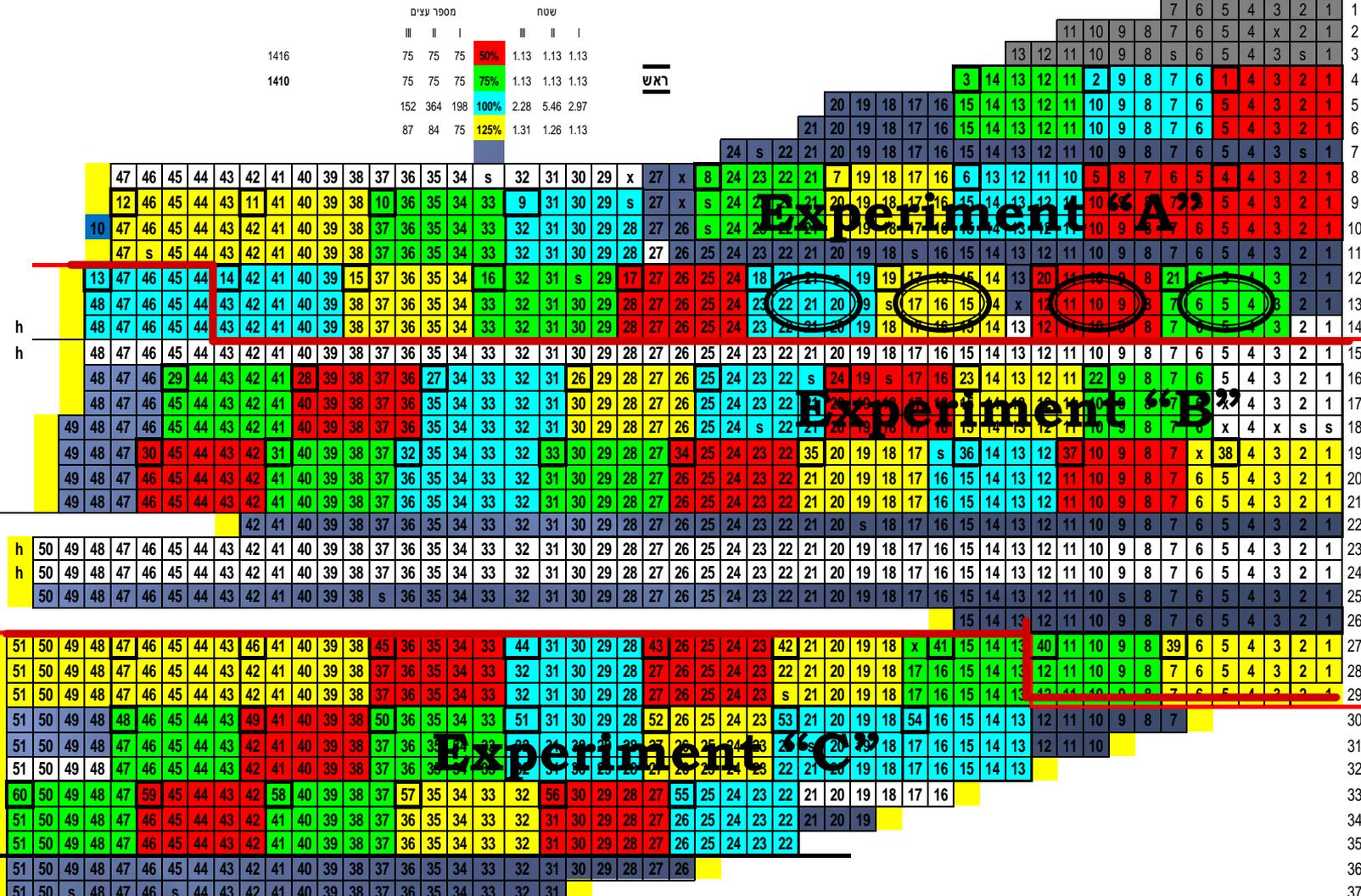
51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

מספר עצים			שטח		
75	75	75	1.13	1.13	1.13
75	75	75	1.13	1.13	1.13
152	364	198	2.28	5.46	2.97
87	84	75	1.31	1.26	1.13

צפון →

מרווח נטיעה 3*5
עץ/דונם 66.66

- קוט מורכב על טומי h
- זן קנט s
- עץ קטן x
- עץ חסר z
- זן אחר (1)
- לוגי של התיפולים h



51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1



Table: Block number according to treatment and phenological period

				א				ב				ג				
58	51	48	47	43	40	34	31	27	24	19	15	12	11	7	1	125%
56	52	50	49	45	26	37	33	28	21	20	16	9	6	2	2	100%
61	59	55	53	42	41	36	30	38	23	18	13	10	8	3	3	75%
60	57	54	46	44	39	35	29	32	25	17	14	5	4	1	4	50%

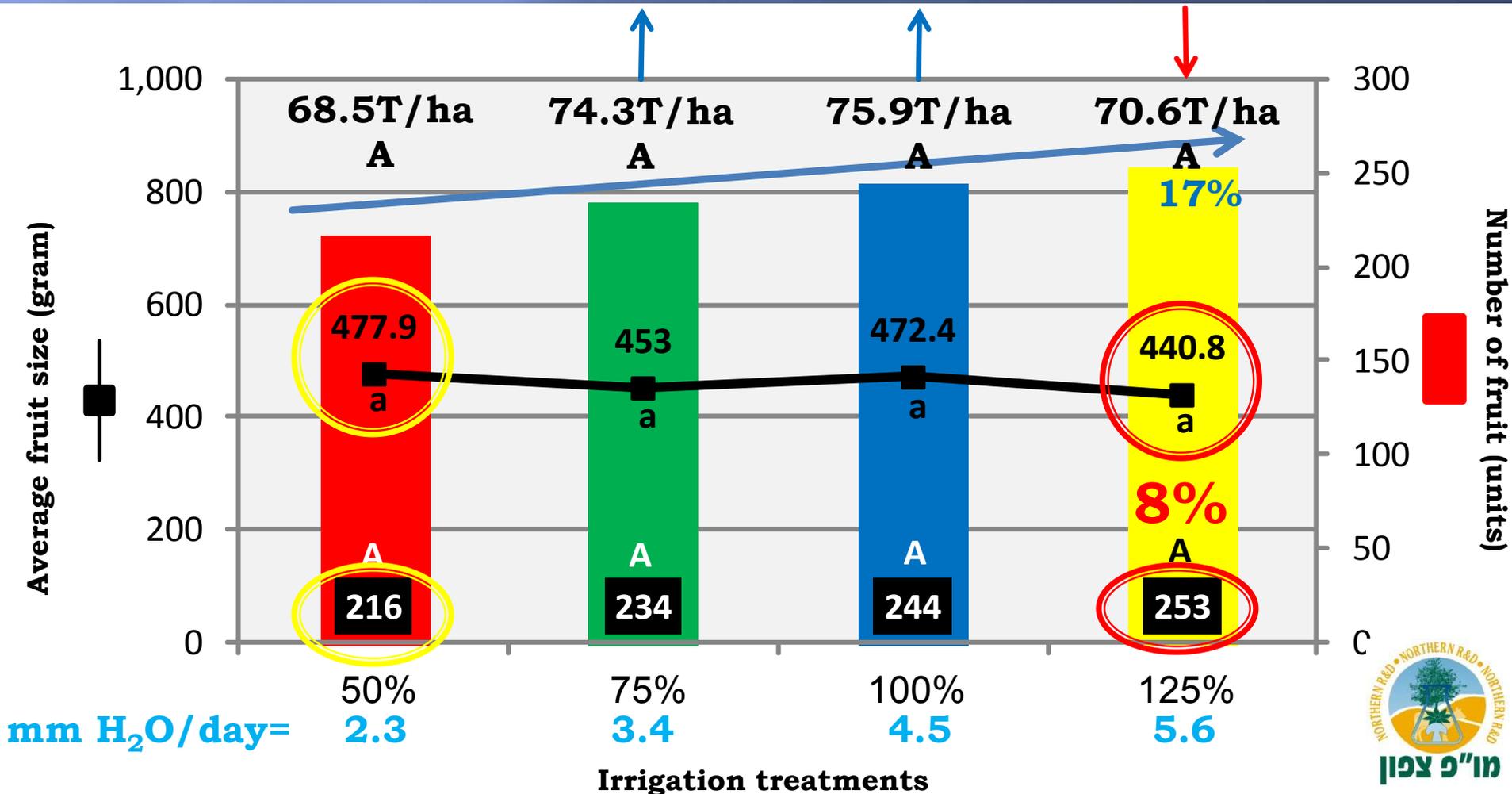


Results

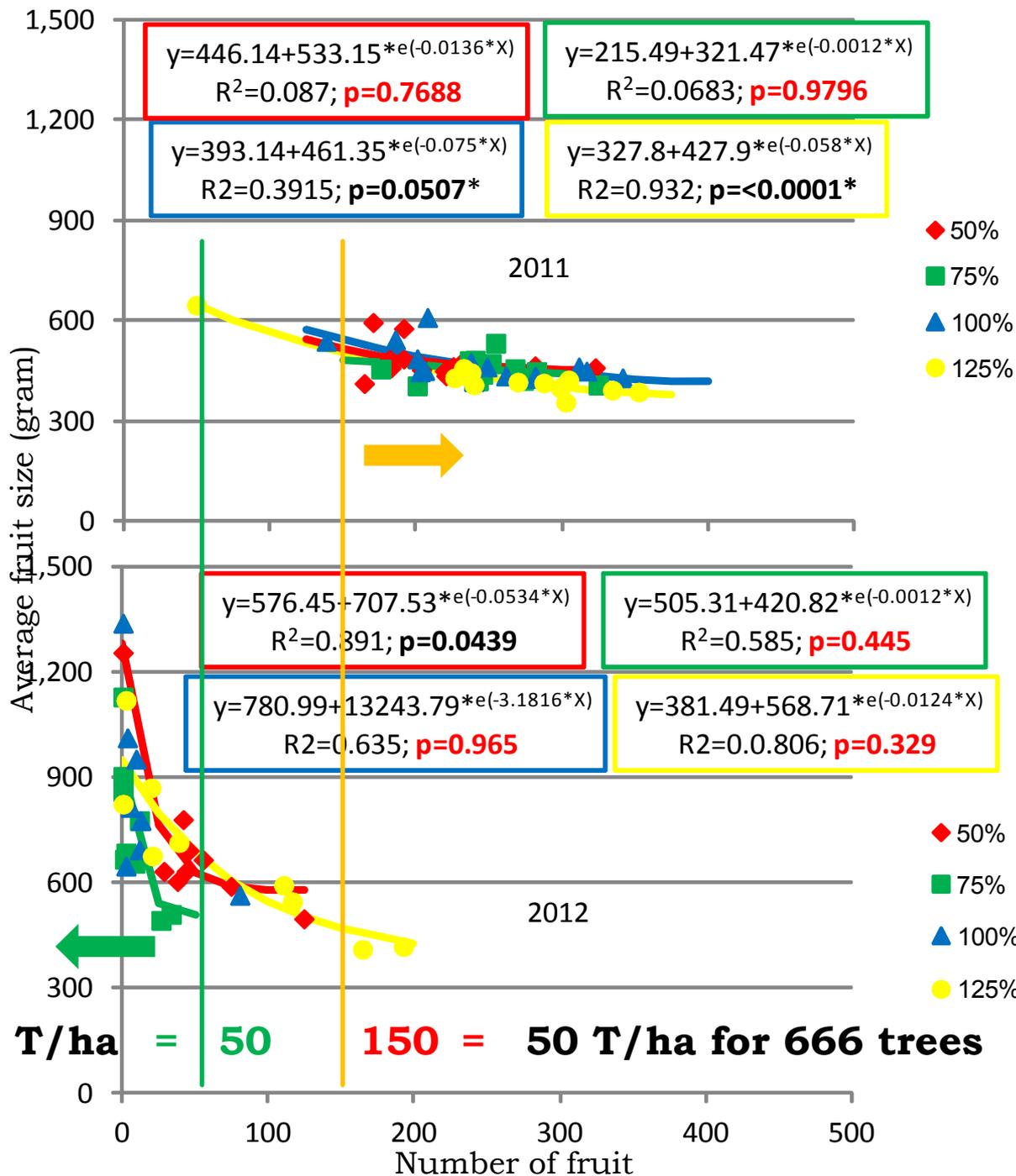
Yield

First phenological stage (A):
“Fruit set-pit hardening”

Number of fruit and average fruit size at the different irrigation treatments in phenological stage "A": fruit set-pit hardening. (2011).



Relative
th



tree and
tion
"ON"
Average yield
in the plot=
72,3 T/ha.

"OFF"
Average yield
in the plot=
8.5 T/ha.

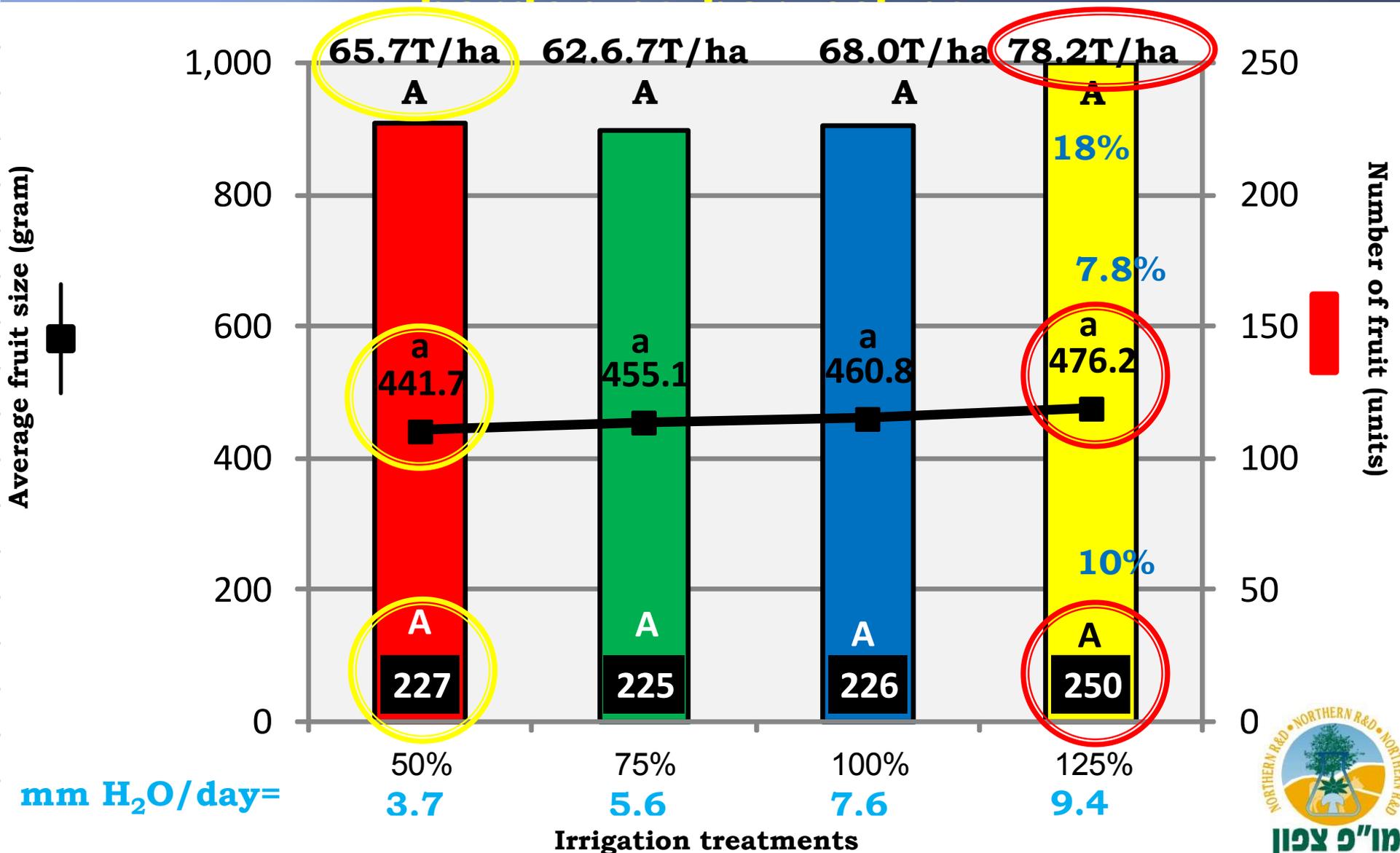


Results

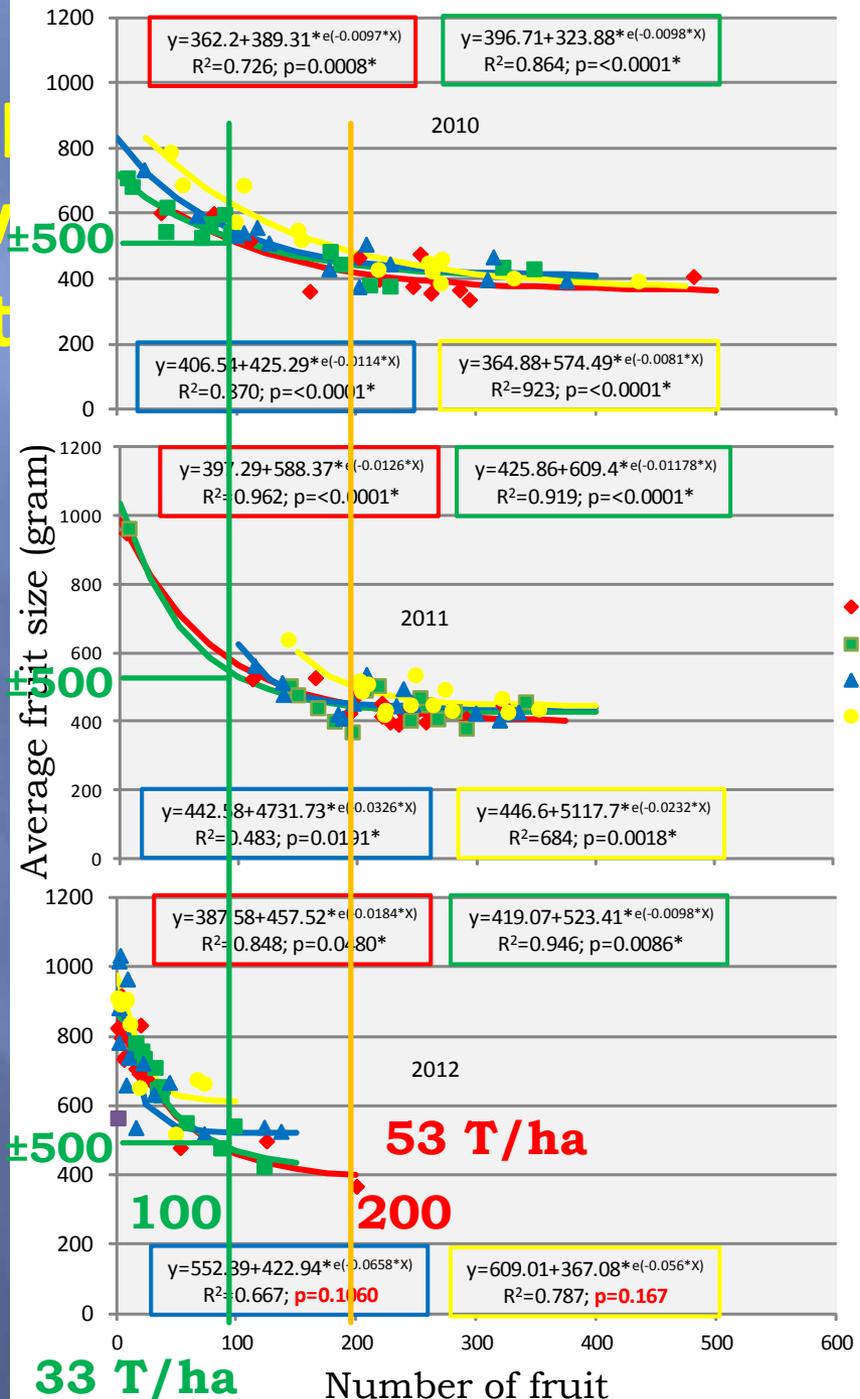
Yield

Second phenological stage (B):
“pit hardening-harvesting”

Number of fruit and average fruit size in the different irrigation treatments at phenological stage "B": pit



Relationship
their av
treatment at



per tree and
"ON"
irrigation
Average yield
in the plot=
49,8 T/ha.

"ON"
Average yield
in the plot=
68,6 T/ha.

"OFF"
Average yield
in the plot=
11.3 T/ha.

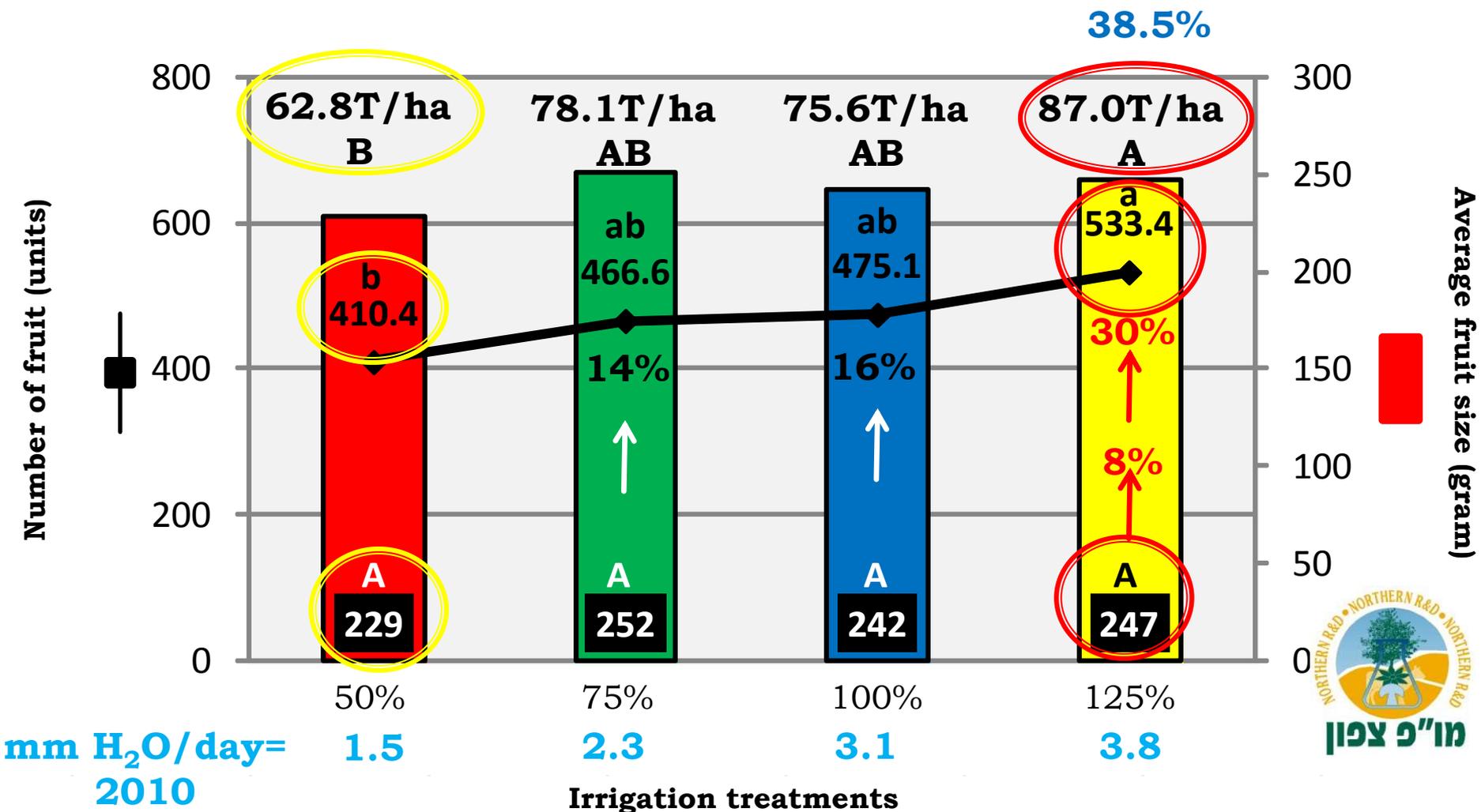


Results

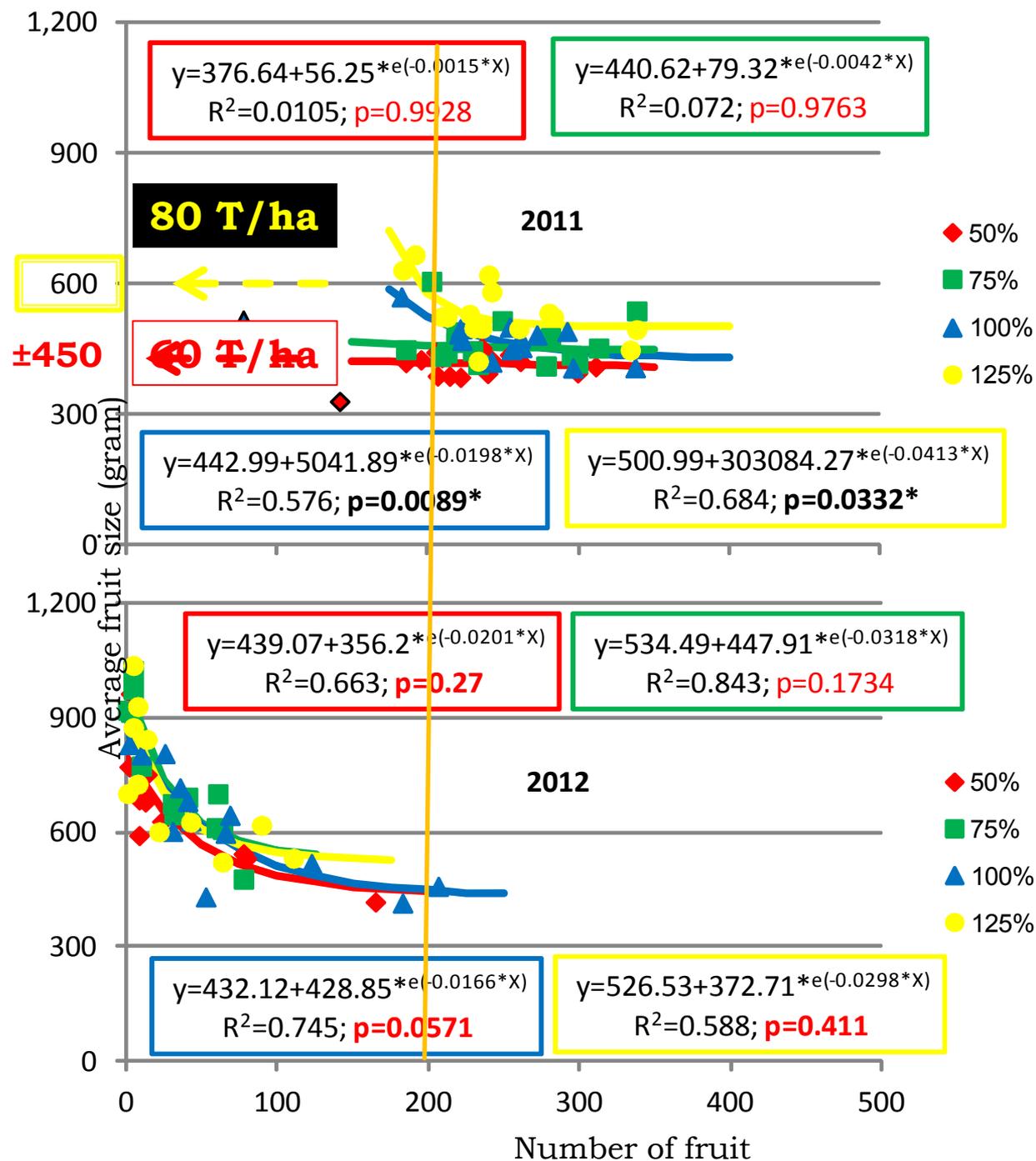
Yield

Third phenological period (C):
"Post harvest"

Number of fruit and average fruit size in the different irrigation treatments at phenological stage "C": post harvest - (2011).



Rel
tree



tree and
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t harvest.

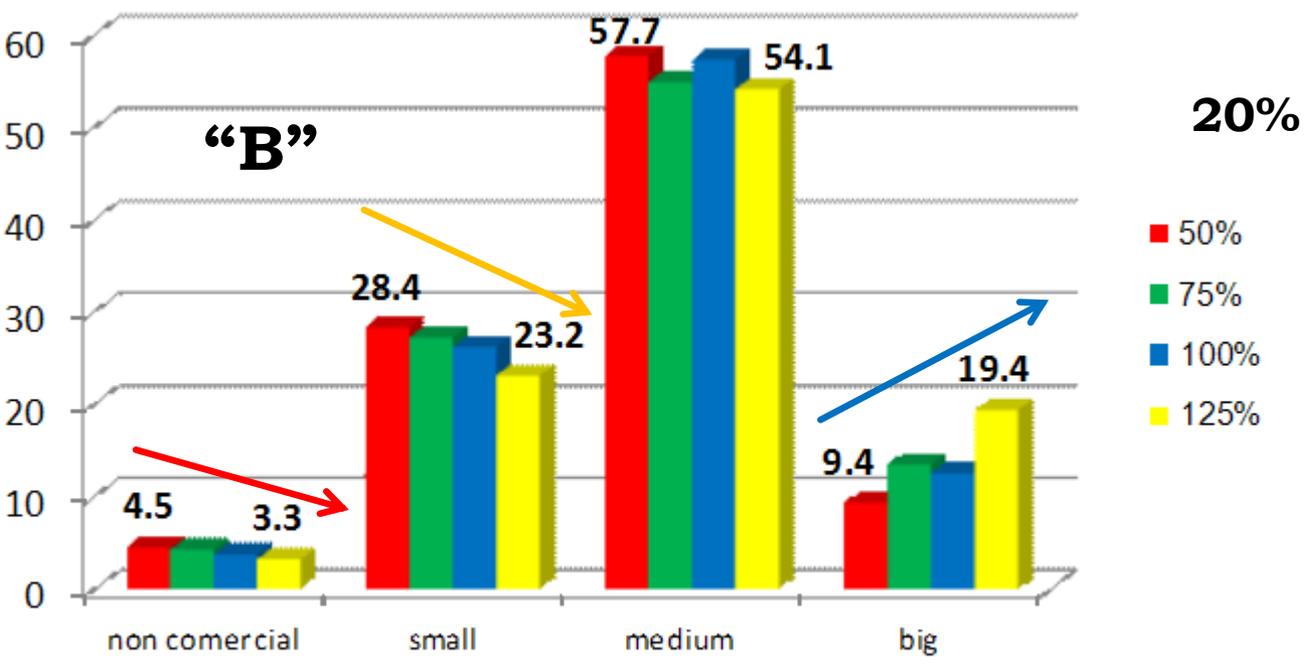
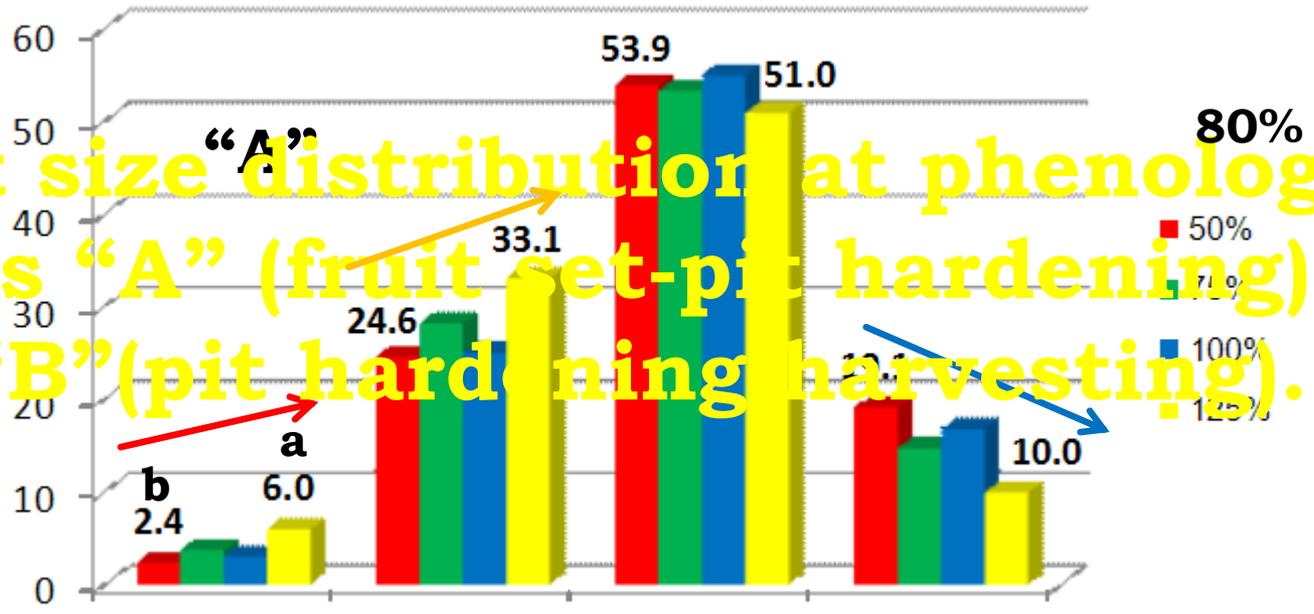
Average yield
in the plot=
75,9T/ha.
"ON"

Average yield
in the plot=
14.1T/ha.
"OFF"

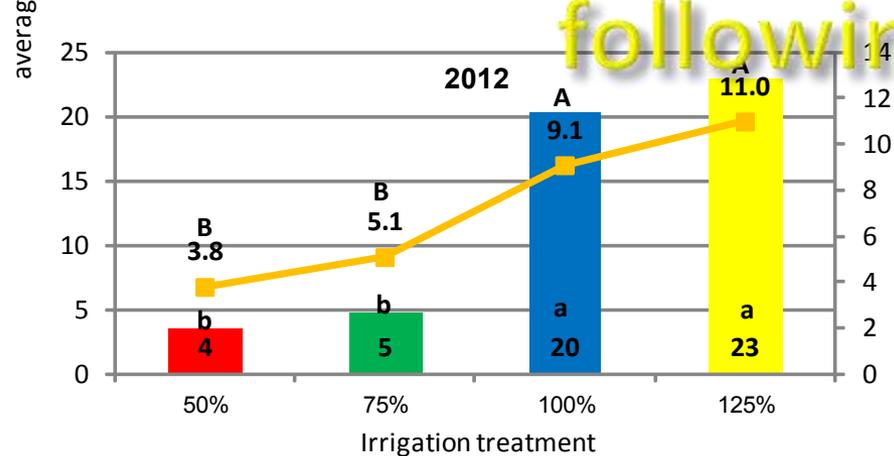
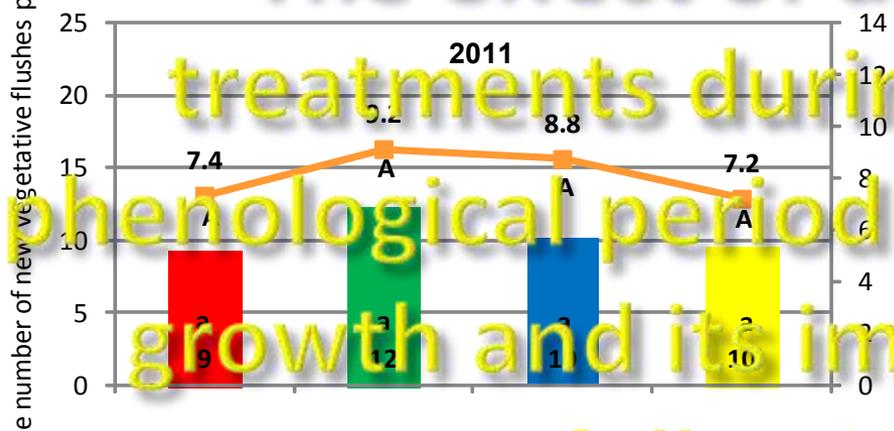
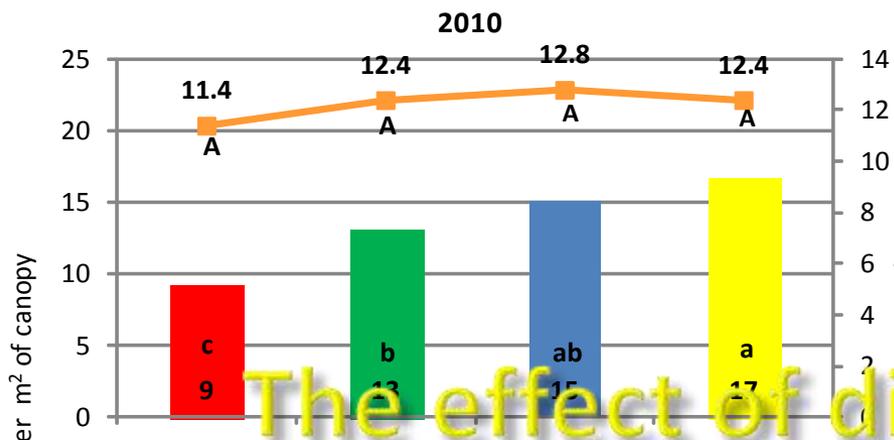


Large fruit (4-6); Medium fruit (7-9); Small fruit (10-14); non-commercial (>14)

Fruit size distribution at phenological stages "A" (fruit set-pit hardening) and "B" (pit hardening-harvesting).



“ON” “OFF”



Treatment	2010	Yield 2011	2012
50%	44,100	62,860	10,400
75%	39,150	78,150	10,980
100%	40,280	75,620	20,950
125%	51,040	86,970	9,940

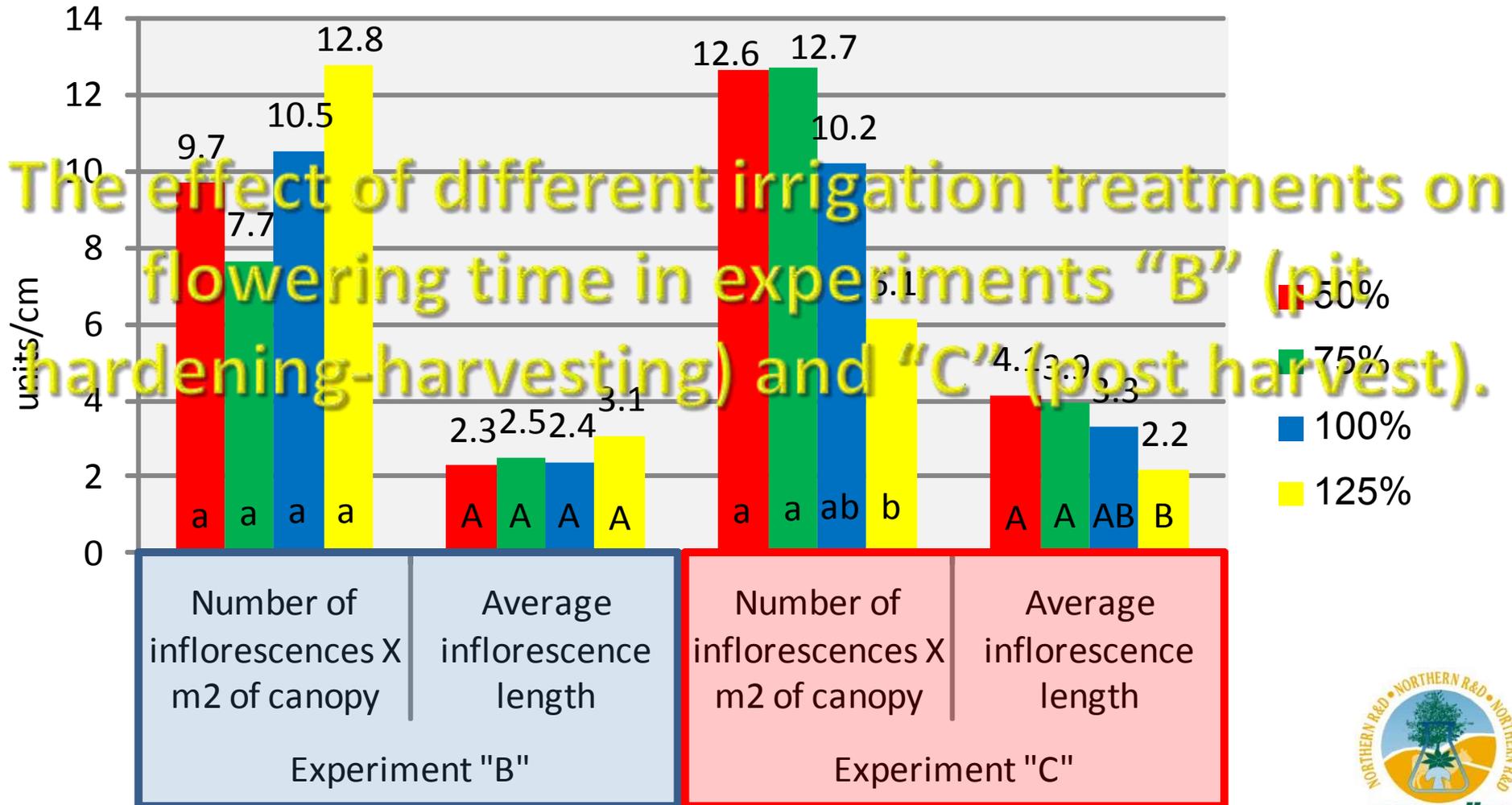
The effect of different irrigation treatments during the post harvest phenological period on autumn vegetative growth and its impact on yield in the following season.

Treatment	Total yield
50%	117,360
75%	128,280
100%	136,850
125%	147,950



Flowering 2013

The evaluation was carried out at the beginning of the flowering season (mid-February).



Conclusions

1. The post harvest phenological period (no fruit on the trees) seems to be the most sensitive to irrigation and has the largest impact on fruit production in terms of both quantity and quality (fruit size).
2. The first phenological period “Fruit set-pit hardening” seems to be more sensitive to over-watering rather than to slightly deficient irrigation (25% less than the recommended water quantity for this period).

3. In the second phenological period “pit hardening-harvesting”, water quantity seems to be more relevant in productive “ON” years rather than “OFF” years.
4. The irrigation policy should consider not only the different phenological periods but also the production level of the trees for the particular year (“ON” or “OFF”).
5. The final fruit size in the case of mango seems to be mainly affected by the amount of reserves in the tree (starch, sugars, etc...) rather than the number of fruit carried by the tree itself.

6. In conclusion: three seasons for an irrigation experiment are insufficient for developing a proper irrigation policy. However, at this stage there are some indications that some water saving potential could be achieved mainly in the first phenological period. Under certain growing conditions this may also be possible in the second period. No water saving should be done during the post harvest period before an “ON” season.

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Thanks!! for your
attention.

