Treatments against dead flower buds on root pruned Conference with Zinc-Metalosate in spring

Introduction and aim

Since a few years there are Conference parcels where a part of the flower buds dies back in winter. The cause of this phenomena isn't known yet, but often root pruning is indicated as an important factor. In this trial the influence of root pruning is examined. Furthermore the ability of Zinc-Metalosate to reduce the number of dead flower buds in spring is looked at.

Experimental design

The trees are in their 13th growth year and the rootstock is Quince Adams. The planting distance is 3.50 x 1.50 m or 1.714 trees per ha. The trees have never been treated with CCC.
From 1999 on, the trees were either left untreated, root pruned on 1 side (side changed every year; 1 RP + 1 RP) or pruned on 2 sides (2 RP). The distance was about 30 cm. In 2005 root pruning was carried out very short to the trunk. Because in 2007 the trees were still very calm, no root pruning was performed.
In spring of 2003 each object was divided into 2. Half of the trees were treated 4 times with Zinc-Metalosate at a rate of 2.5 l/ha. In 2004 these trees were treated again but the point of time was shifted more backwards, namely to June. Also only 3 sprays were applied. In 2005 and 2006 again 3 sprays were applied at a rate of 2.5 l/ha.

This gives us the following objects :

Object	Root pruning (RP)					Zinc-Metalosate 2.5 l/ha		
	2003	2004	2005	2006	2007	2004	2005	2006
Control	-	-	-	-	-	-	-	
Control + Zn-Metalosate	-	-	-	-	-	07/06, 16/06, 28/06	24/05, 07/06, 22/06	14/06, 27/06, 07/07
1 RP + 1 RP	13/03	-	24/03	-	-	-	-	-
1 RP + 1 RP + Zn-Metalosate	13/03	-	24/03	-	-	07/06, 16/06, 28/06	24/05, 07/06, 22/06	14/06, 27/06, 07/07
2 RP	13/03	-	24/03	-	-	-	-	-
2 RP + Zn-Metalosate	13/03	-	24/03	-	-	07/06, 16/06, 28/06	24/05, 07/06, 22/06	14/06, 27/06, 07/07

Results

Flower bud quality

On March 28th the flower bud quality was determined. A distinction was made between dead flower buds and buds retarded in phenology.

Table 1 : Flower bud quality on March 28th

Object	% good buds	% dead buds	% buds retarded
Control	86.1 b	8.0 a	5.8 ab
Control + Zn	85.3 b	7.8 a	7.0 a
1 RP + 1 RP	90.3 ab	5.5 a	4.2 ab
1 RP + 1 RP + Zn	86.1 b	7.8 a	6.1 a
2 RP	88.4 ab	7.2 a	4.5 ab
2 RP + Zn	93.6 a	4.2 a	2.2 b

Some say root pruning is a potential cause of dead flower buds. Therefore in this trial roots were pruned very severely. Nevertheless the results didn't show any influence of root pruning on the number of dead buds. Even after severe 2-sided root pruning the number of dead flower buds didn't increase.
Because of the high percentage of healthy flower buds, treatments with Zinc-Metalosate couldn't offer any surplus. Only after the 2-sided root pruning there was a minor effect.

Yield data 2007

At the beginning of the season the number of flower clusters was counted, while at harvest on August 24th yield was determined.

Table 2 : Yield data 2007

Object	Kg/tree	Number of pears	Fruit weight (g)	Number of clusters
Control	26.1 a	148 a	177 a	99.7 a
Control + Zn	26.3 a	152 a	174 a	100.3 a
1 RP + 1 RP	26.6 a	167 a	161 a	108.0 a
1 RP + 1 RP + Zn	27.0 a	171 a	159 a	137.7 a
2 RP	29.0 a	187 a	156 a	149.3 a
2 RP + Zn	27.0 a	168 a	161 a	115.7 a

In summer fruits were thinned by hand. In the next table the total fruit set is represented.

Table 3 : Fruit set 2007

Object	Number of clusters	Picked fruits	Fruits thinned by hand	Number of fruits/ 100 clusters
Control	100 a	148 a	58 a	209 a
Control + Zn	100 a	152 a	56 a	207 a
1 RP + 1 RP	108 a	167 a	54 a	228 a
1 RP + 1 RP + Zn	138 a	171 a	66 a	174 a
2 RP	149 a	187 a	69 a	188 a
2 RP + Zn	116 a	168 a	65 a	204 a

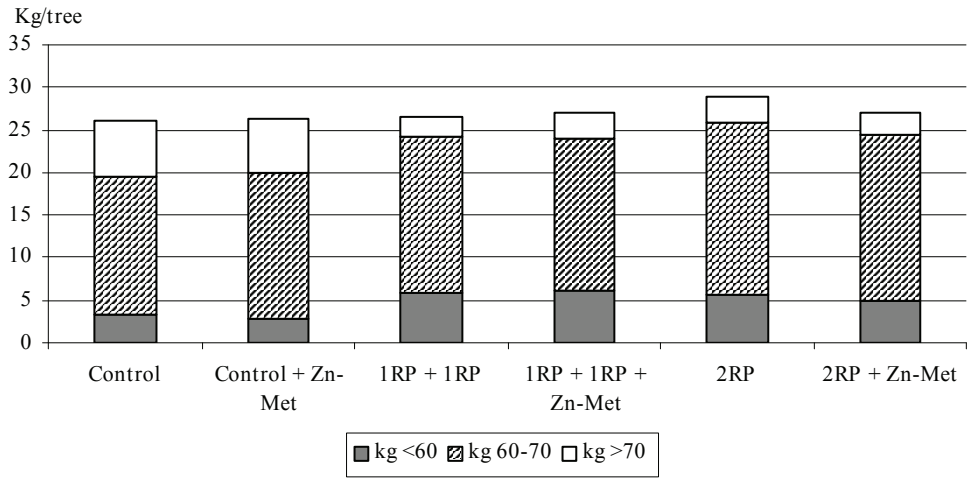

Figure 1 : Fruit size

In 2007 the root pruned trees started with a bit more flower buds than the control object, because of which the total number of fruits was also higher. The fruit weight however was about 15 grams lower after root pruning. Therefore the production of the different objects didn't vary much.

Last year treatments with Zinc-Metalosate didn't have any influence on the number of flower buds or on fruit set. Neither fruit size nor total production showed improvement.

Yield data 2004-2007

Already since spring of 2003, these trees have been treated with Zinc-Metalosate. In the following figures, production results (kg/tree, number of flower buds and total number of pears) from 2004 till 2007 are presented.

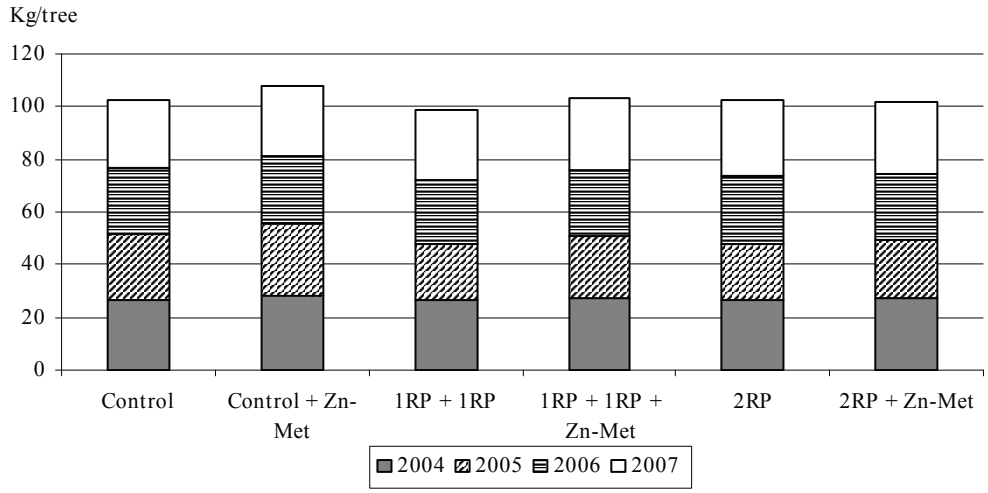

Figure 2 : Total yield 2004-2007

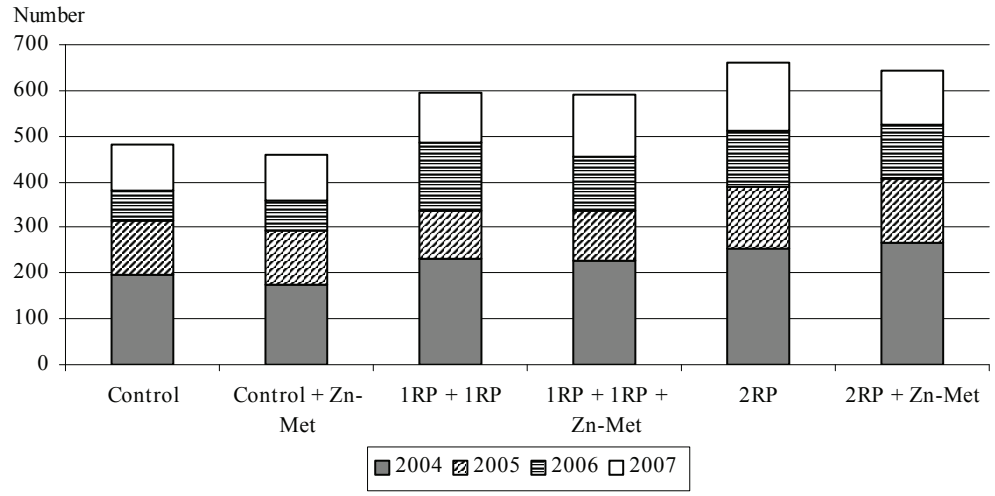

Figure 3 : Total number of flower buds 2004-2007

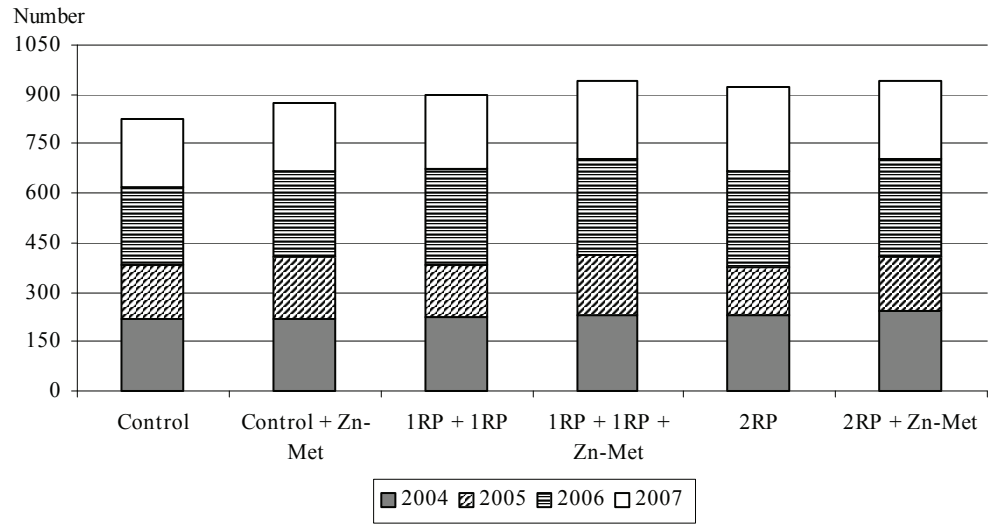

Figure 4 : Total number of fruits 2004-2007

After 4 years total production of the root pruned objects and of the untreated objects was about the same. After root pruning the number of flower buds was significantly higher. 2-sided root pruning even gave a surplus of about 150 flower buds. The difference in total number of pears was smaller.

After treatment with Zinc-Metalosate, production over 4 years was about 5 kg/tree higher. Only after 2-sided root pruning production was about the same. Despite of the fact that Zn-Metalosate treatment didn't give more flower buds, the total number of fruits was higher. This indicates that flower buds were stronger.

Discussion

Because of the low occurrence of dead flower buds in this trial, the effect of Zinc-Metalosate was very limited.
In 2007 there was also no influence on the amount of flower buds or on the number of pears, so production was comparable to the untreated objects.
After 4 years however, total production shows a slight increase, not because of a higher number of flower buds, but because of a higher number of pears. This indicates that flower buds were stronger after a Zinc-Metalosate treatment.

Conclusion

In other trials Zinc-Metalosate is effective against dead flower buds. Due to the limited occurrence of dead flower buds in this trial, no surplus could be obtained. Flower bud quality however improved after Zinc-Metalosate treatment in spring.