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Post-harvest treatment with KP-1.

Exp. nr.: 3303-3

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Introduction.

KP-1 has been developed in Japan and is a potential compound for a cut flower preservative and is possibly a substitute for STS. It is a white powder, freely soluble in water and exhibits acidic property in a solution. For use the pH has to be adjusted to 4.0 - 5.0 with NaOH. In carnation it prevents (or delays) petal wilting and inhibits ethylene production and action. In rose it delays flower opening.

In this study the effects of a pretreatment with KP-1 have been compared with a pretreatment with STS.

Materials and methods.

The flowers were harvested at the growers and transported in dry conditions to the Research Station. Then the stems were recut, the flowers were wrapped in paper or in sleeves and they were placed in the pretreatment solutions at 20°C, 60% relative air humidity for 4 hours. They were then kept dry for 20 hours at 17°C in a cardboard box and after this period replaced in water for 4 hours at 5°C.

The flowers were placed in the vase containing tap water in groups of 3. The vase life was measured at 20°C, 60% relative air humidity and a light phase of 12 hours in a period of 24 hours, 1.5 W/m².

The flowers used were: carnation 'Desio', and 'Ember Rose'
 spray carnation 'Barbara', and 'Karina'
 Physostegia
 Delphinium elatum
 Veronica
 Asclepias
 Lilium 'Enchantment'

The pretreatment solutions were: water (control)
 STS (containing silver 21.6 mg/l)
 KP-1 1.2%
 KP-1 0.6%
 KP-1 0.3%
 KP-1 0.15%

'Desio' and 'Ember Rose' were also treated with ethylene 0.5 ppm and 'Enchantment' was treated with ethylene 0.9 ppm during the dry period of 20 hours.

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Vase life was determined from placing the flowers in the vase upto the moment that 50% of the inflorescence was wilted (spray carnation, Delphinium, Asclepias and Veronica) or when the flower was wilted (carnation) or when the last open flower of the inflorescence was wilted (Lilium) (Table 1, 2).

The flowering percentage is the number of open buds per stem, calculated as percentage of the total number present per inflorescence (Table 3).

Results

Spray carnation

Karina and Barbara were picked a little too early, so the flowering percentage was low, especially of Barbara. Pre-treatment with KP-1 decreases the vase-life of Karina and of Barbara in the two highest concentrations.

It has also a negative effect on the flowering percentage of Karina. Flower damage occurs on the first day in the vase with light spots on the petals of Karina and blueing of all the buds and flowers of Barbara (Figure 1).

Carnation

In two different experiments Desio was treated with water, STS and KP-1. In the first experiment the vase-life of Desio was decreased by pre-treatment with KP-1 (Figure 2), in the second experiment the vase-life was increased only by pre-treatment with STS. Especially in the first experiment there was flower damage: black edges.

Pre-treatment with STS was the only one which gave the flowers protection against ethylene.

The results with Ember Rose are the same as with Desio (Figure 3). There was no flower damage.

Veronica

Veronica was harvested when 50% of the florets of the inflorescence were open.

Pre-treatment with KP-1 increased the vase-life of Veronica. Pre-treatment with KP-1 0.3 % gave the best results (figure 4).

Physostegia

In the first experiment Physostegia was harvested when 25% of the florets of the inflorescences were open and in the second experiment none of the flowers were open (harvested too early).

In the first experiment pre-treatment with KP-1 1.2% decreased the vase-life and the flowering percentage (figure 2) and in the second experiment pre-treatment with KP-1 0.6% did the same (figure 4).

Asclepias

Asclepias was harvested when the first flower of the inflorescence was open.

There was no effect of a pre-treatment with STS or KP-1 (figure 4).

Delphinium

Delphinium was harvested when nearly all the florets of the inflorescence were open and the first flowers dropped.

There was no effect of a pre-treatment with STS or KP-1 (figure 4), probably the flowers were harvested too late (full bloom).

Lilium

Lilium was harvested when the first flower of the inflorescence was coloured.

STS increased the vase-life and the flowering percentage enormously.

There was no effect of a pre-treatment with KP-1.

Pre-treatment with STS was the only one which protects the flowers against ethylene (Figure 5).

Conclusions

Pre-treatment with KP-1 has no effect on the vase-life and the flowering percentage of the spray- carnations 'Barbara' and 'Karina' and the Lilium 'Enchantment' and on the vase-life of the carnations 'Desio' and 'Ember Rose'.

There was no effect of pre-treatment with STS or KP-1 on the vase-life of Asclepias and Delphinium.

Flower damage appeared after pre-treatment with KP-1 in the higher concentrations on the flowers of 'Barbara', 'Karina' and 'Desio' (first experiment).

There is a positive effect of KP-1 on the vase-life of Veronica and a little positive effect on the vase-life and flowering percentage of Physostegia.

It looks like that KP-1 neither protects the flowers against internal ethylene nor against external ethylene.

Table 1. Vase-life in days. Objects with different letters are statistically different ($p=0.01$).

Pre-treatment	Barbara	Karina	Desio	Veronica	Physostegia		Asclepias	Delphinium
					1	2		
Water	11.1 A	14.2 A	9.3 A	11.8 C	9.2 B	13.5 AB	10.7	5.6
STS	11.1 A	14.8 A	8.6 A	11.7 C	11.2 A	15.5 A	12.5	6.7
KP-1 1.2%	8.1 B	9.1 C	5.5 B	-	6.6 C	-	-	-
KP-1 0.6%	9.2 B	12.1 B	5.8 B	16.3 A	11.1 A	11.4 B	10.4	6.1
KP-1 0.3%	11.3 A	11.3 B	6.3 B	14.5 B	11.1 A	14.3 AB	12.4	6.7
KP-1 0.15%	-	-	-	14.0 B	-	13.0 AB	12.6	5.9
LSD	1.9	2.1	1.7	1.3	1.8	3.1		

Table 2. Vase-life in days. Treatment with or without ethylene during the dry period. Objects with different letters are statistically different ($p=0.01$)

Pre-treatment	without ethylene		with ethylene	
	Desio	Ember Rose	Desio	Ember Rose
Water	4.8 B	8.4 B	1.0 B	1.0 B
STS	6.9 A	17.7 A	4.8 A	14.8 A
KP-1 0.6%	4.1 B	8.4 B	1.0 B	1.0 B
KP-1 0.3%	4.0 B	7.9 B	1.0 B	1.0 B
KP-1 0.15%	4.6 B	8.8 B	1.0 B	1.0 B
LSD	1.8	1.4	0.5	1.3
				Enchantment
				6.3 B
				17.7 A
				6.6 B
				7.0 B
				6.6 B

Table 3. Percentage of flowering. Objects with different letters are statistically different (p=0.01)

Pre-treatment	Barbara	Karina	Veronica	Physostegia		without ethylene	Enchantment with ethylene
				1	2		
Water	61.1 A	88.1 A	70.0	78.3 A	62.7 AB	32.7 B	8.0 B
STS	57.3 A	80.4 A	67.3	83.8 A	63.7 A	94.2 A	96.2 A
KP-1 1.2%	40.3 AB	55.6 B	-	53.3 B			
KP-1 0.6%	29.6 B	72.4 AB	62.7	70.0 A	33.7 B	29.7 B	10.7 B
KP-1 0.3%	61.3 A	78.3 A	66.0	80.3 A	56.0 AB	26.0 B	18.9 B
KP-1 0.15%	-	-	63.6	-	50.7 AB	37.9 B	13.3 B
LSD	32.8	19.9		14.2	18.8	13.3	13.3

Figure 1.

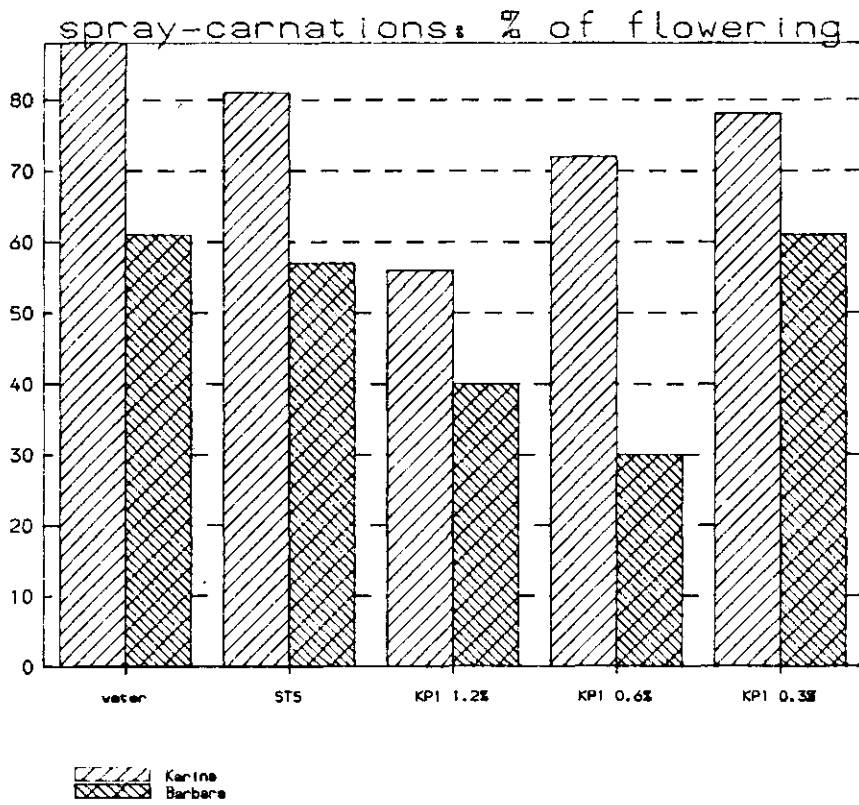
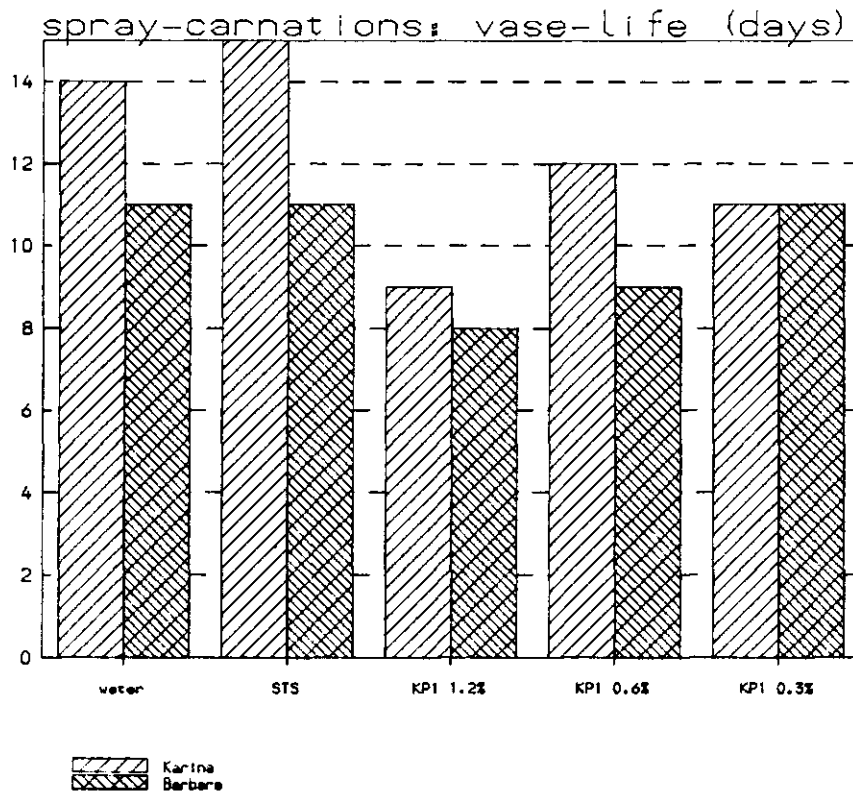


Figure 2.

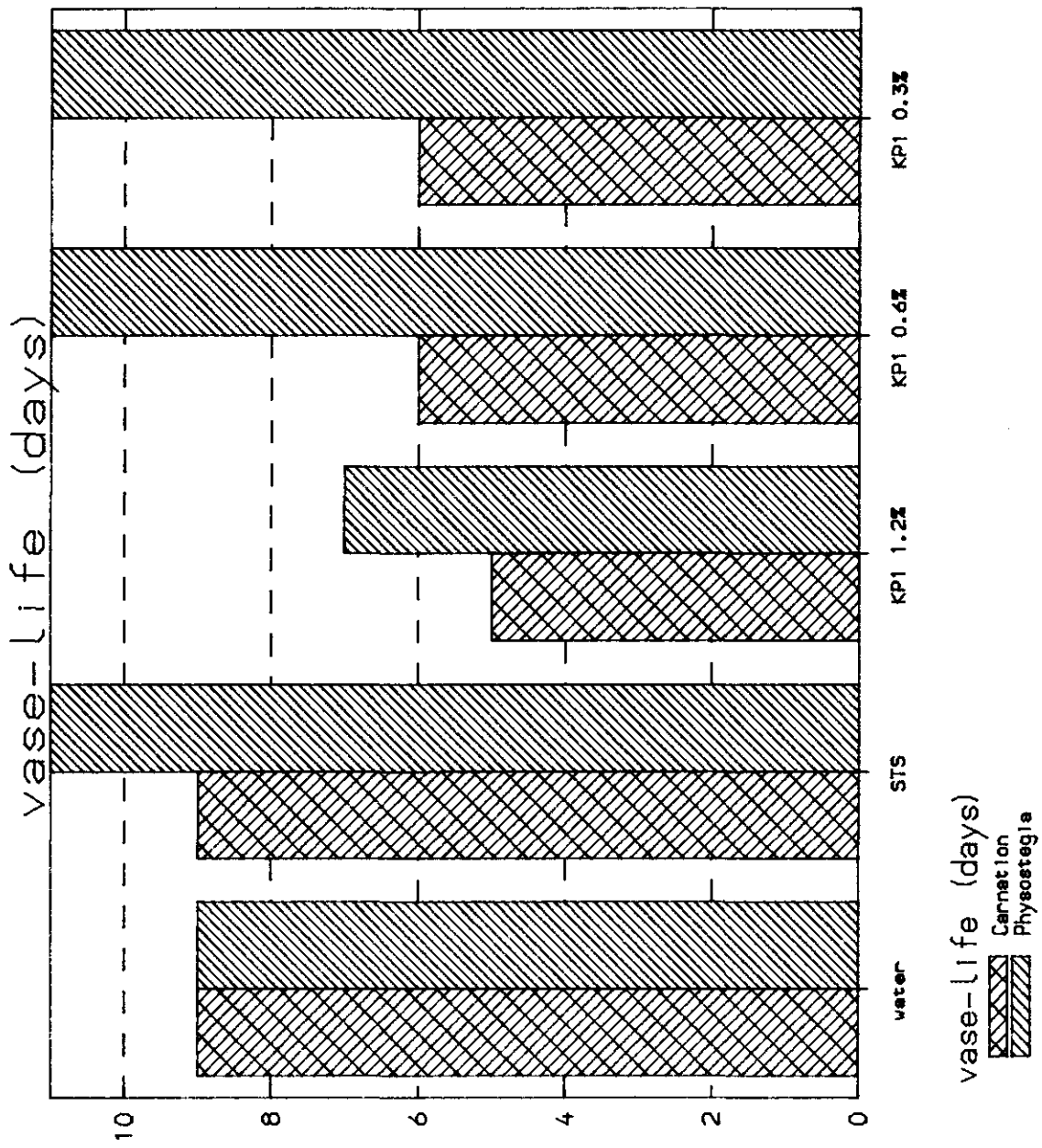


Figure 3.

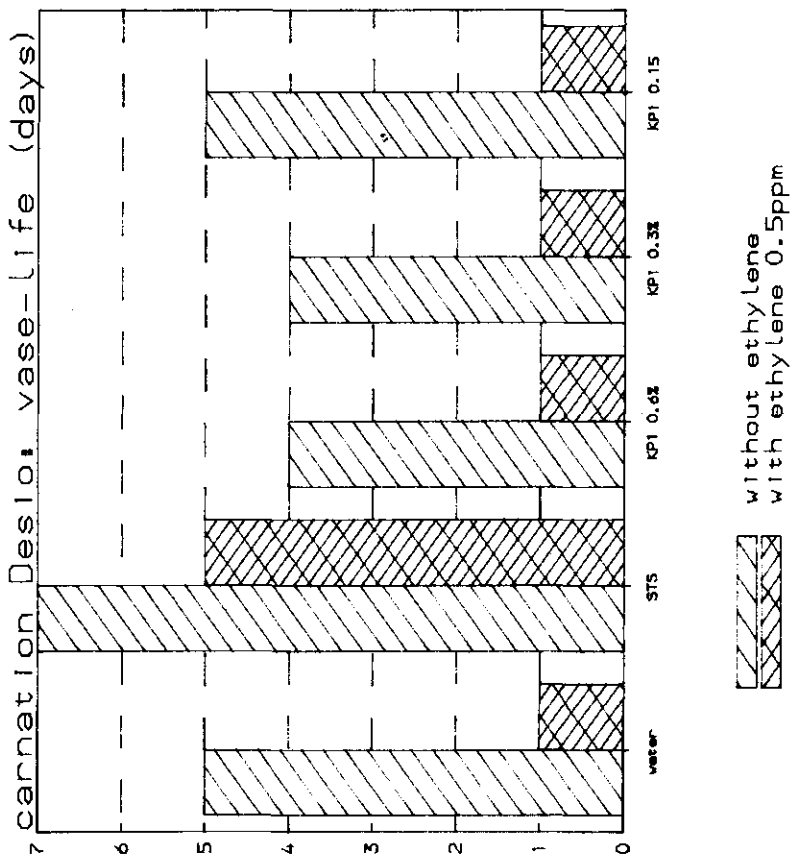
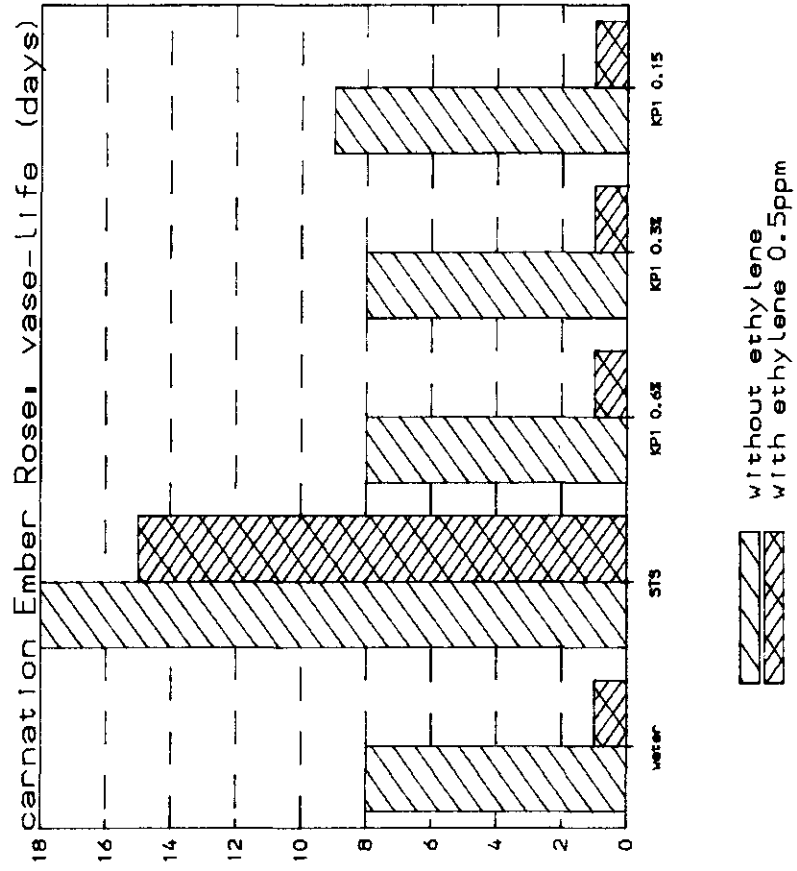


Figure 4.

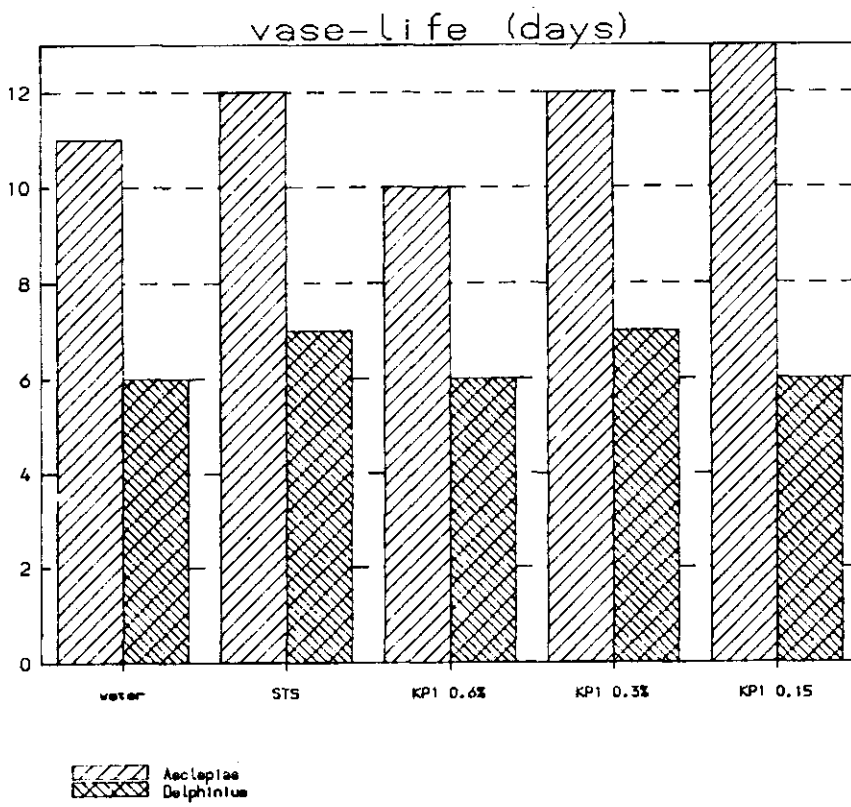
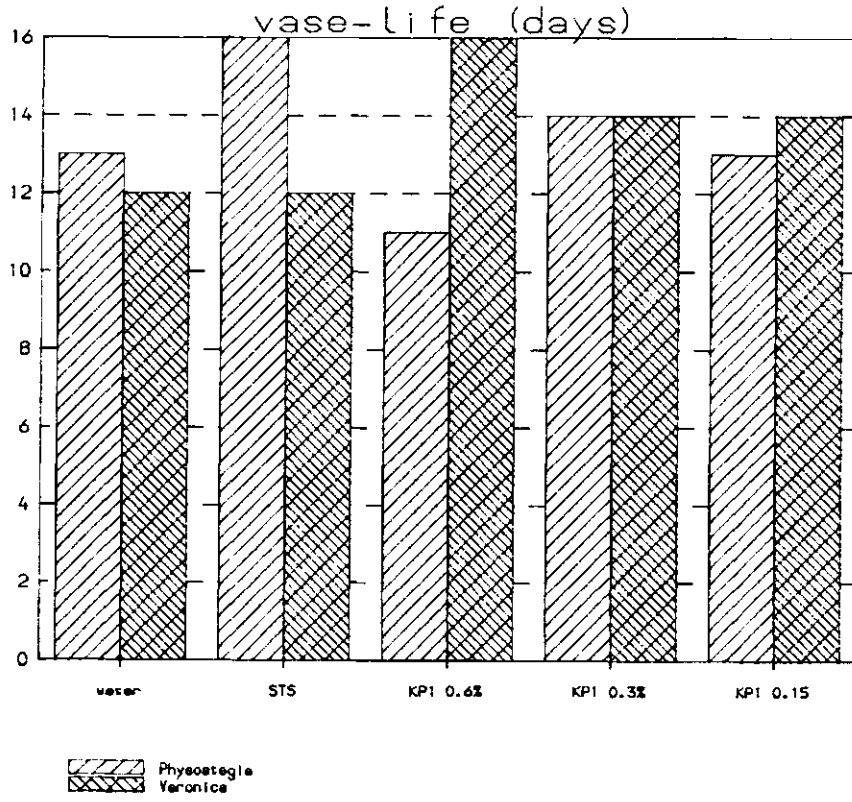


Figure 5.

