

**Product**

Penergetic-p

**Application by**

Research Institute for Cotton and Fibrous Plants  
Research Center for Cotton Plants of Tay Nguyen

**User Application Report****Technical advisor****Date**

May 2002

---

**Trial Results on the effects of Penergetic-p on the resistance of the cotton plant against diseases as well as on yields with the winter – spring harvest in the Gia Lai Province.**

Responsible for Trial: Nguyen Van To, Engineer (M. Sc.)

**1. Problem Definition**

Fertilizers are an important factor for the yield of the cotton plant. Apart from nitrogen, phosphorus and potash, this plant requires a series of other minerals in minimal doses to be able to produce enzymes, playing an important role for the intake of nutrients. According to the manufacturer, penergetic-p contains nutrients effecting positively the plant's growth process.

In order to determine these effects, during the dry period of 2002 we conducted trials with the objective to examine the influence of penergetic-p on the entire growth process as well as the resistance capacity of the cotton plant versus diseases and insect attacks as well as on the yield of the winter-spring harvest.

**2. Purpose of Trials**

To determine the impact of Penergetic-p on growth, robustness towards diseases and insect attacks as well as yields of the cotton plant.

**3. Contents and Methodologies****3.1 Trial Period and Location**

In the community of Phu Can, the District of Krong Pa and the Province Gia Lai  
Date of planting: November 25, 2001

**3.2 Trial Variants**

- Variant 1: Mixing Penergetic-p with other fertilizers (800 g Penergetic-p / ha) applied twice
- Variant 2: Penergetic-p dissolved in water and in equal quantity at same point in time sprayed over the fields
- Variant 3: Control Variant – according to habitual methods

**3.3 Type of Seeds**

Seed type VN01-6 (good disease and insect resistance).

**3.4 Size of Trial Plot**

The size of the trial plot is 500 m<sup>2</sup> and the trial is not repetitive.

### 3.5 Parameters of Observation

Measuring of plant height 90 and 120 days after planting; vegetation period at this point of time when 50% of plants carry initial fruits.

Insect count (insects and worms per 100 plants) causing exterior damage to the plants.

Insect count (insects and worms per 100 plants) causing inner damage to the plants.

Percentage of infested plants.

Theoretical and actual yield.

Number of sprays with pesticides.

## 4. Results

All cultivation measures were executed in line with guidelines provided by the branch office of the Institute of the Gia La Province. During the entire trial period 5 pesticides applications (sprays) were done, once immediately after planting and 4 times till harvest.

### 4.1 Influence of Trial Parameters on Pest / Parasite Behavior

Weather conditions during the winter-spring harvest were not optimal. There was hardly any precipitation, which had certain influence on growth and replication of insects in the cotton plants.

#### Table 1

“Green beetles” were already observed in low density during initial observations. The attack is intensifying till completion of harvest.

In average attack density is:

- Variant 1      11,10 / 100 leaves
- Variant 2      13,22 / 100 leaves
- Variant 3      13,42 / 100 leaves

Here we may talk of a relatively low density of the green beetle. In general it may be stated that there are hardly any differences between the 3 variants with regards to the replication of the green beetle.

A bug, which mainly had a damaging effect on the blossoms, was observed during all observation intervals.

The highest density of this bug was observed in

- Variant 1      on 31.01. & 15.03.02 with 194,4 / 100 leaves
- Variant 2      on 20.03.02 with 137,77 / 100 leaves
- Variant 3      on 15.03.02 with 277 / 100 leaves

The calculation index T between the variants is however smaller than in the table. Because of this, the average number of insects / 100 leaves remains unchanged during all observation intervals (or there are hardly any differences).

**Table 1**

Date	Number of beetles/100 leaves			Number of bugs/100 leaves		
	Var. 1 pen p with fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control with fertilizer	Var. 1 pen p with fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control with fertilizer
10.01.	0.00	2.20	0.00	12.22	3.30	0.00
17.01.	13.33	4.40	3.30	43.33	48.88	37.27
23.01.	7.77	3.30	5.50	130.00	73.33	100.00
31.01.	0.00	4.44	4.44	194.44	347.77	78.88
06.02.	4.44	0.00	4.44	163.33	162.22	106.66
20.02.	0.00	2.22	2.22	12.66	1377.70	109.88
27.02.	4.44	13.33	6.66	126.66	204.44	182.22
06.03.	166.66	8.88	13.11	145.55	132.22	130.00
15.03.	17.77	16.66	31.11	194.44	144.44	227.00
20.03.	27.77	58.88	35.55	81.11	117.77	30.00
27.03.	30.00	31.11	23.33	24.44	13.33	10.00
Average	11.11	13.22	13.42	111.65	238.68	92.04
T (RG)	T1+3=0.43	T2+3=0.29		T1+2=0.69	T2+3=1.22	

Thanks to preventive measures this year, other insect species, causing especially great damage during the dry period, were hardly detected.

**Table 2****Behavior of "jumping beetle" and "red spider" with cotton plant**

Date	Number of jumping beetles/100 leaves			Amount of red spider/100 leaves		
	Var. 1 pen p with fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control with fertilizer	Var. 1 pen p with fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control with fertilizer
10.01.	12.22	40.00	14.44	0.00	3.33	1.10
17.01.	105.55	104.44	148.88	81.00	20.00	0.00
23.01.	44.44	51.11	83.33	85.55	71.11	38.88
31.01.	122.22	70.00	113.33	675.55	151.11	124.66
06.02.	76.66	28.88	54.44	0.00	66.66	23.33
20.02.	108.88	27.77	33.33	228.88	542.22	111.11
27.02.	318.88	465.55	152.22	81.11	106.66	67.77
06.03.	247.77	162.22	173.33	21.11	22.22	88.88
15.03.	83.33	78.88	340.00	84.44	20.00	15.50
20.03.	32.22	42.22	50.00	161.11	3.33	104.44
27.03.	20.00	1.10	0.00	3.33 0.00		5.50
Average	106.56	97.47	105.75	129.28	91.51	52.83
T (RG)	T1,3=0.24	T2,3=0.29		T1,3=0.63	T2,3=0.11	

**Table 3****Behavior of "green beetle" and green beetle eggs on trial plots**

Date	Number of eggs/100 leaves			Amount of red spider/100 leaves		
	Var. 1 pen p & fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control & fertilizer	Var. 1 pen p & fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control & fertilizer
10.01.	0.00	36.66	50.00	0.00	0.00	0.00
17.01.	370.00	320.00	343.33	3.33	0.00	0.00
23.01.	226.66	400.00	126.66	3.33	13.33	0.00
31.01.	63.33	96.66	206.66	6.66	6.60	13.33
06.02.	146.66	73.33	90.00	6.66	0.00	6.66
20.02.	280.00	230.00	180.00	6.66	3.33	6.66
27.02.	370.00	526.60	413.33	3.33	16.66	6.66
06.03.	500.00	280.00	230.00	10.00	10.00	20.00
15.03.	53.33	76.66	150.00	0.00	6.00	16.66
20.03.	46.66	46.66	86.66	6.66	13.33	0.00
27.03.	0.00	6.60	6.66	10.00 0.00		0.00
Average	186.97	190.29	171.21	5.15	6.33	6.66
T (RG)	T1,3=0.24	T2,3=0.29		T1,3=0.63	T2,3=0.11	

Although the number of insect eggs is relatively high during all observation periods, the amount of insects is low. This is evidence for the robustness of the seed type versus diseases and insect attack. Also, the average of green worms and green worm eggs in all variants is similar to the statistics. Also the result with regards to the "natural enemies" of mentioned insects is similar.

**Table 4**

Date	Number of spiders/100 leaves			Number of beetles/100 leaves		
	Var. 1 pen p & fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control & fertilizer	Var. 1 pen p with fertilizer	Var. 2 pen p in water & fertilizer	Var. 3 Control & fertilizer
10.01.	13.33	16.66	16.66	0.00	0.00	0.00
17.01.	20.00	16.66	23.33	0.00	0.00	0.00
23.01.	10.00	30.00	10.00	0.00	0.00	0.00
31.01.	6.66	6.66	2.66	0.00 0.00		0.00
06.02.	0.00	0.00	0.00	0.00 0.00		0.00
20.02.	13.33	13.33	16.66	56.66	26.66	23.33
27.02.	20.00	13.33	16.66	33.33	53.33	13.33
06.03.	30.00	16.66	16.66	36.66	33.33	50.00
15.03.	3.33	6.66	0.00	3.33	10.00	6.66
20.03.	13.33	80.00	16.66	6.66	13.33	0.00
27.03.	0.00	6.66	10.00	0.00	3.33	0.00
Average	11.82	18.78	11.75	12.42	12.73	8.48
T (RG)	T1,3=0.017	T2,3=1.01		T1,3=0.51	T2,3=0.59	

## Remarks

Above spiders and beetles are those, which eat and destroy insects and worms damaging the cotton plant.

Although the dry period was relatively long, we were hardly in a position to recognize the fungus attack (leaves nearly appear being burned). The infestation "white mould" (a fungus) had its peak versus the end of the growth period / harvest to an average extent.

In Table 5 the different variants of the effect / development of "white mould" can be seen.

**Table 5**

Variant	White mould 90 days after planting		White mould 120 days after planting	
	Infestation / Attack %	Disease codex	Infestation / Attack %	Disease codex
with pen p fertilized	56.00	13.20	100	64.40
with pen p sprayed	66.00	17.40	100	60.00
control	62.00	13.40	100	56.00
%-portion	21.00	46.00	-	18.80

## 4.2 Influence of trial parameters on growth and development of the cotton plant

From table 6 we learn that timing of infestation readiness in both variants – with Penergetic-p fertilized and sprayed – is the same. In the variant – with penergetic sprayed – the period of readiness is longest (121,60 days), much longer than with the control variant (118,80 days). This variance has statistical significance.

The height of the plant 90 and 120 days after planting is greater in both trial variants than with the control.

**Table 6**

### Distinctive features of the cotton plant

Variant	Duration from planting to 50 % open fruits	Plant height 90 days after planting cm	Plant height 120 days after planting cm
penergetic fertilized	121.60 days	70.10	79.02
penergetic sprayed	120.20 days	71.10	74.70
control	118.80 days	65.20	69.72
CV %	0.92	12.30	18.52
LSD	2.16	4.83	5.30

Results in Table 7 show that the number of fruits per plant as follows

- variant 1 with 7,85 fruits per plant (largest)
- control with 6,77 fruits per plant (smallest).

This difference has statistic meaning.

Also with regards the index of theoretical yield versus number of fruits per m<sup>2</sup> similar results were achieved.

Concerning the actual yield in our trial, the yield in variant 1 (2.23 tons/ha) is highest.

**Table 7**

Variant	Density (10'000 plants/hectare)	Number of fruits/plant	Number of fruits/m <sup>2</sup>	Theoretical yield in metric hundred weights/Hectare	effective yield in metric hundred weights/Hectare
penergetic fertilized	6.54	9.90	64.62	42.08	23.40
penergetic sprayed	7.38	7.85	57.28	35.05	19.00
control	6.52	6.77	43.96	27.82	17.10
CV %		18.28	16.10	15.82	
LSD 0.05		2.06	12.27	7.62	

**Table 8****Economic viability**

Costs	Penergetic p fertilized	Penergetic p sprayed	Control
maintenance costs	1560	1560	1560
harvest costs	1170	950	55
<b>material costs</b>			
nitrogen fertilizer	366	366	366
phosphate	300	300	300
potash	17	187	187
SA	171	171	171
PIX	50	50	50
Seeds	520	520	520
<b>plant protection</b>			
insecticides	360	360	360
penergetic p	240	240	0
total costs	5116	4896	4561
total revenue	12.870	10.450	9.405
variance	7.754	5.554	4844
incrementals versus control variant	2.910	710	

Costs in Vietnamese currency (VND).

Based on Table 8, the efficiency of the application of penergetic p is clearly evidenced. Variant 1 proves to be most effective (7.754 VND/ha), 2'910 VND/ha more than control. Also variant 2 is better than the control.

## 5. Conclusion and suggestions

### 5.1. Conclusion

With Penergetic-p (fertilized) it is possible to extend the period of fruit growing, which increases the number of fruits per plant and herewith the actual yield.

Penergetic p (in both variants - fertilized and sprayed) has neither influence on the ratio of infected plants, nor on the disease codex with fungus "white mould".

By using Penergetic-p highest economical efficiency is achieved.

### 5.2. Suggestions:

The same trial range is to be planned during the forthcoming harvests, so as to draw more precise conclusions.

Nha Ho, 22 May, 2002

Responsible for the trial: Nguyen Van To, Engineer (M. Sc.)