Use of penac in Vietnam - Summary

Introduction

Summary of the report on the use of penac-p, g, k of the Ministry of Rural Economy and Country Development in Vietnam.
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Overview

With the approval of the Municipal Office for Science, Technology and Environment Hanoi (S&T), the Municipal Office for Agriculture and Forestry Hanoi (A&F), the company Plocher Energiesysteme, D-Meersburg, and the Penac Trading AG, CH-Kesswil, rice and water tests with different Penac products have been performed since April 1994. After a testing period of 6 months, a meeting was held on 18 October 1994 in the framework of which the initial results were evaluated as positive. The meeting was organised by the S&T and was performed in the presence of representatives of the Ministry of Agriculture. The most important results of the first tests in Vietnam also were announced in the Vietnamese television (VKT transmission) on 8 January 1995. Immediately after the meeting, a memorandum between the A&F, the S&F, and the company Plocher-Energiesysteme was undersigned in order to perform large scale trials with Penac products. Then the Department for Technological Science and Product Quality considered it necessary to perform more detailed studies on Penac products. The Institute for Soil and Fertilisers was charged to set up further trials in order to establish foundations for a recognition of Penac products. Therefore, trials with penac-p, k, and g have been performed by the Institute since 1995.

The results presented herein have been taken from the reports of the Technical Centre for Vegetables, Flowers and Fruits - Hanoi, the Agricultural Production and Service Company Gialam, the S&T, and the Corporation for animal breeding and animal food (Ministry of Rural Economy and Country Development Vietnam).

Penac-P in the Rice Cultivation

In the period from 1994 to 1996, different tests with penac-p in the rice cultivation were performed in Vietnam under supervision of the Ministry of Rural Economy and Country Development.

In a first trial, several rice fields of 100m ²were manured with 10 t of liquid manure / 120 kg N / 60 kg P_2O_5 / 60 kg K_2O per ha. In addition, several spraying operations were performed with penac-p. The used quantities and the results can be seen in Figure 1.

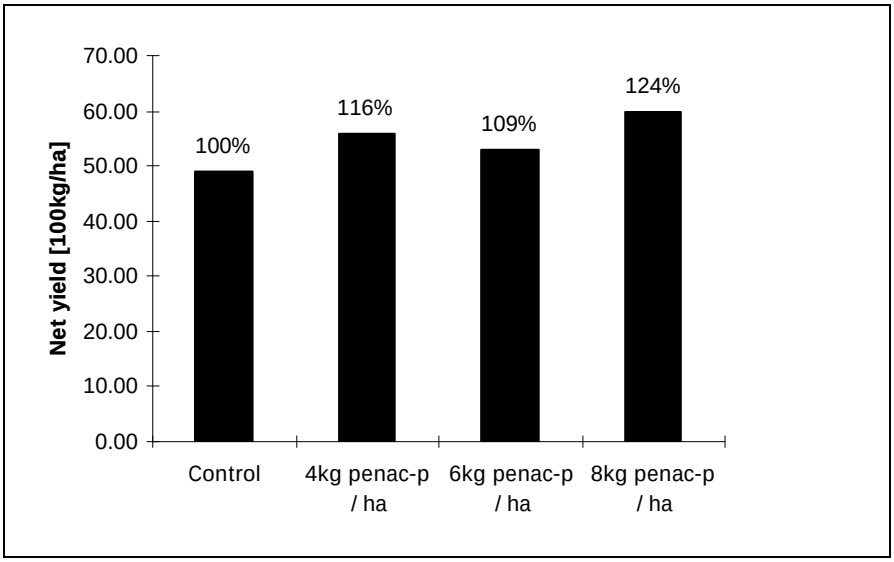

Figure 1-Increase of the rice yield by means of Penac-P

Another test statistically confirmed the results of the first test. In addition, the quantity of the nitrogenous fertilizing was gradually reduced. On test areas of 70m ²each, the yields, the ramification, the grains per ear and further values were determined.

Figure 2 shows the net yields on the different test areas. The manuring per ha was 10 t of liquid manure / 120 kg N / 90 kg P_2O_5 / 60 kg K_2O.

The best result was achieved by the variant with a nitrogen amount reduced by 25% and 3 kg penac-p per ha. This is also the best variant under economic aspects. These results from the spring harvest 1995 could be confirmed in the summer harvest 1995. The yield of said variant was, with 104% compared with the control variant, even slightly higher.

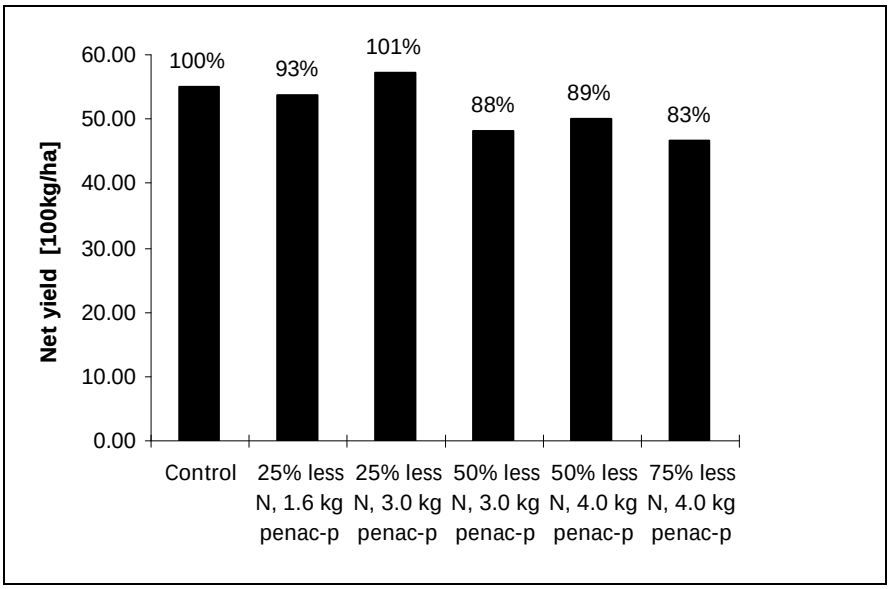

Figure 2 - Results after the reduction of nitrogen

The variant with reduction of the nitrogen amount by 25% and 3 kg penac-p per ha was also tested in the framework of a large scale trial on 22 farms. The treated areas were separated from the untreated ones by means of slime protection walls. With respect to 7 test farms, the yields were the same or

slightly lower, with respect to 15 farms, the yields were higher. In addition, an improved wind stability of the plants and a reduction in the number of broken rice grains could be observed. In subsequent chemical analyses, no negative effects of penac-p on the fertility of the ground could be noted.

Penac-K in the Compost Preparation of Municipal Waste

In Hanoi, there are large amounts of municipal compost. Up to now, only 7-8% of these amounts could be composted and used as fertiliser due to the long decay times. In several compost plants, large scale trials were performed with penac-k. The composition of the used municipal compost is shown in the following table:

	Polyester, plastics	Glass, stones	Wood, bones	Rags	Waste paper	Leaves, plants	Sand, humus
Shares	5.7%	9.8%	1.4%	2.4%	9.5%	13.6%	57.6%

Six tons of compost were piled up to heaps on concrete ground and treated with different methods. The control heap was not treated. With respect to the standard method, 20 g/t of penac-k were added. With respect to the anaerobic method, the heap was additionally covered with a plastic tarpaulin. With respect to the ventilation method, 150 tons were treated with penac-p in the compost plant Caudien. In all cases, the initial temperature was 43.9°C.

Figure 3 shows the different development of the compost heaps by means of the number of micro-organisms. With respect to the standard method using penac-k, the compost maturity was achieved 40-45 days earlier than the one of the control heap. The ventilation method was still 7-10 days faster, the anaerobic method was 8-10 days slower.

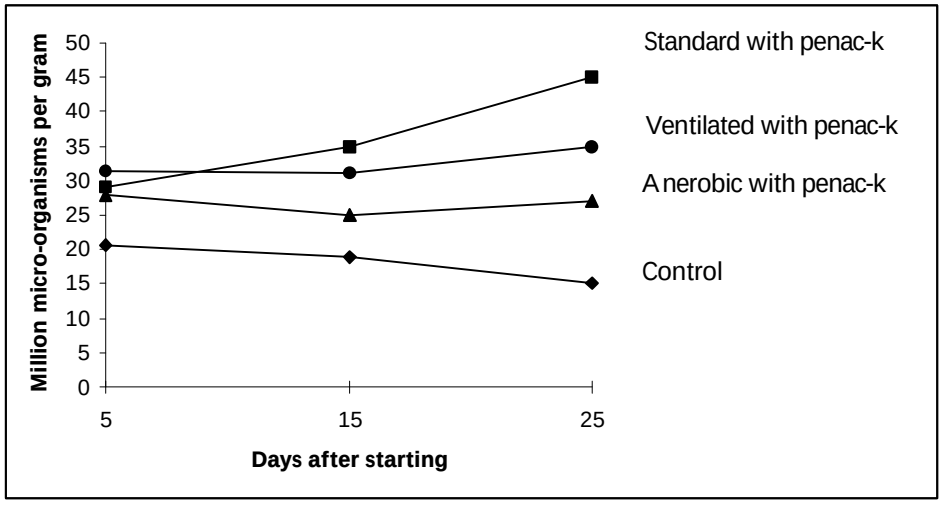

Figure 3. Development of the compost heaps based on the number of micro-organisms.
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The humus quality of the penac compost was considered very positive in various analyses, and the development of bad smells was reduced.

The results showed a clear improvement of the quality, regarding the reduction of the coliforms in the mature compost treated with Penac-K, as can be seen in Figure 4.

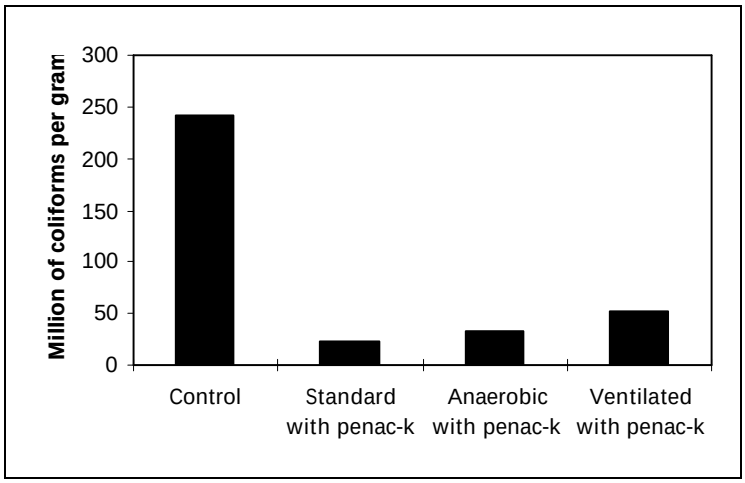

Figure 4 - Number of coliforms per gram

Penac G+K in the Fertiliser Treatment

In 1996, the Institute for Soil and Fertilisers performed tests with pigs 'liquid manure. The liquid manure was put in layers into holes in the ground and covered with mud (with a thickness of 3-5 cm). The six heaps were mixed with different additives, and the samples for the analyses were taken from the centre of each heap. In particular, the loss of nutrients was of interest. Figure 5 shows the losses of organic substances, total nitrogen and easily soluble nitrogen.

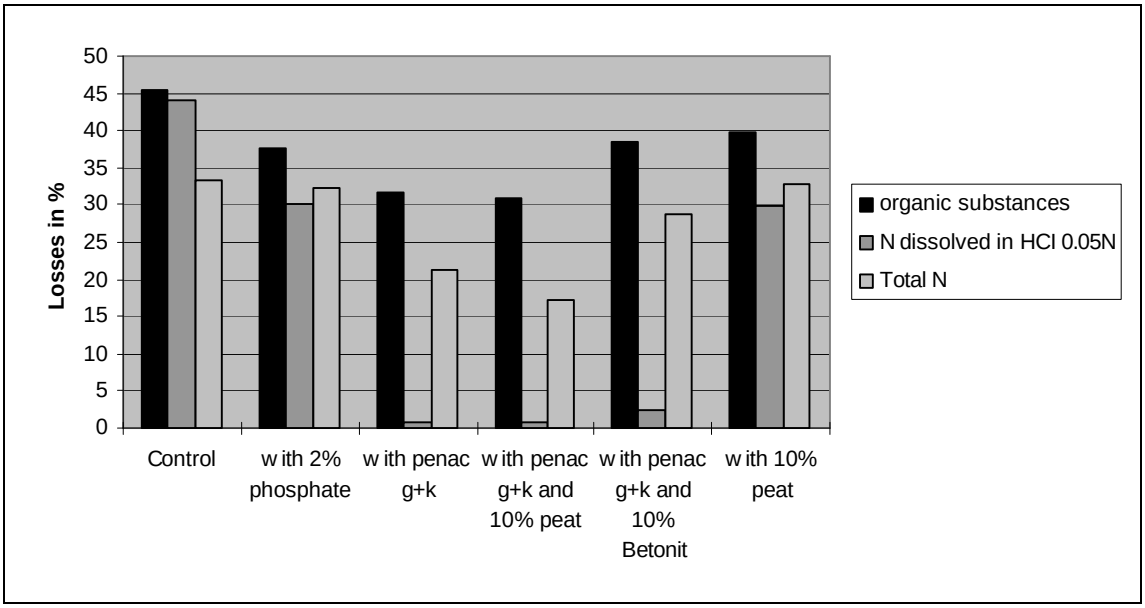

Figure 5 - Losses of organic substances, total nitrogen and easily soluble nitrogen

With respect to the loss of nutrients, the variants with penac clearly showed better results than the other ones. The lowest loss of nutrients occurred with the variant penac g+k and 10% peat. The very low losses of easily soluble nitrogen are noteworthy.

In order to further optimise the compost preparation of the pigs 'liquid manure, the test was repeated in 1997 with slightly modified variants. The biological activity of the liquid manure was determined by means of the number of micro-organisms. Figure 6 shows the development of the micro-organisms during the compost preparation:

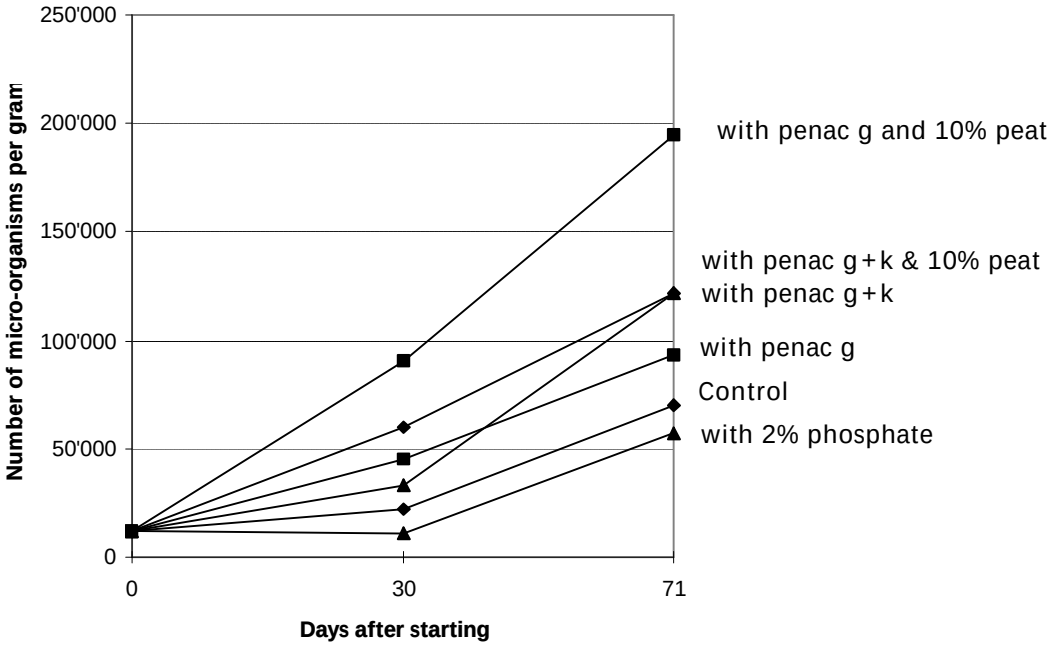

Figure 6 - Development of the micro-organisms during the compost preparation

The variant with penac-g and 10% peat showed the highest activity. In a series of further tests, exact data about the number of actinomycetes, coliforms and worm eggs were collected. The variant penac g+k (20 g each per ton) with 10% peat turned out to show the best results. This variant was further tested in practice in 60 agricultural undertakings in the province of Hanam. One month after the addition of the additives to the pigs 'liquid manure, the number of coliforms was reduced by an average of 99%, the worm eggs had practically completely disappeared. According to statements of the farmers, the annoyance caused by bad smell and the attraction for flies also had reduced.

Penac G+K in the Sewage Compost Preparation

In Northern Vietnam, the habit of manuring the vegetable gardens with human excrements has led to serious problems. About 60% of the village inhabitants suffer from skin diseases. Therefore, the possibilities of purifying the compost with penac g+k were tested in a large scale trial with 8 municipalities. With respect to 6 municipalities and one laboratory test, all measurement data are available.

In all the municipalities, the compost preparation was performed with and without the addition of penac. Thus, the measurements of the pathogenic germs can be directly compared. The following three figures show the number of the different pathogenic organisms which are present in the compost.

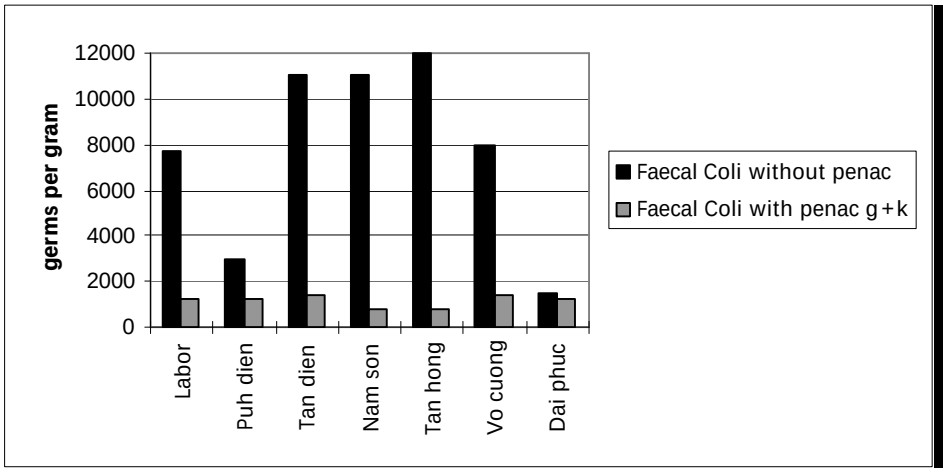

Figure 7 -Number of faecal coli

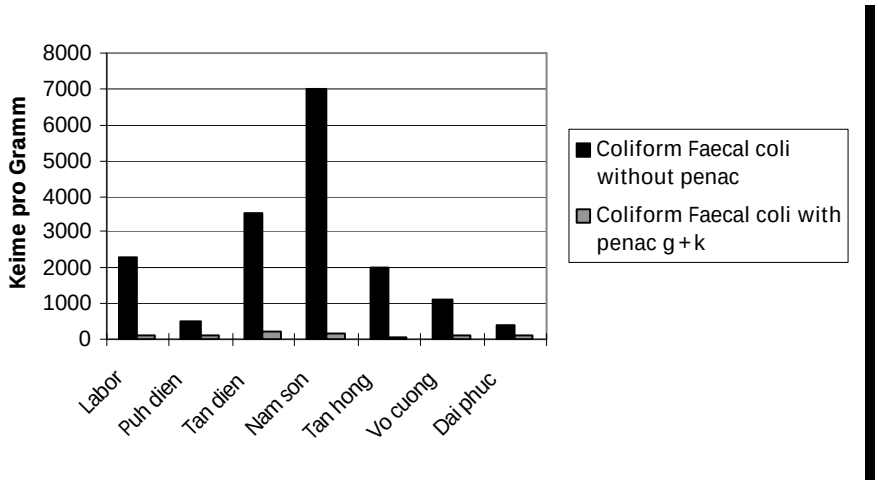

Figure 8 - Number of coliforms

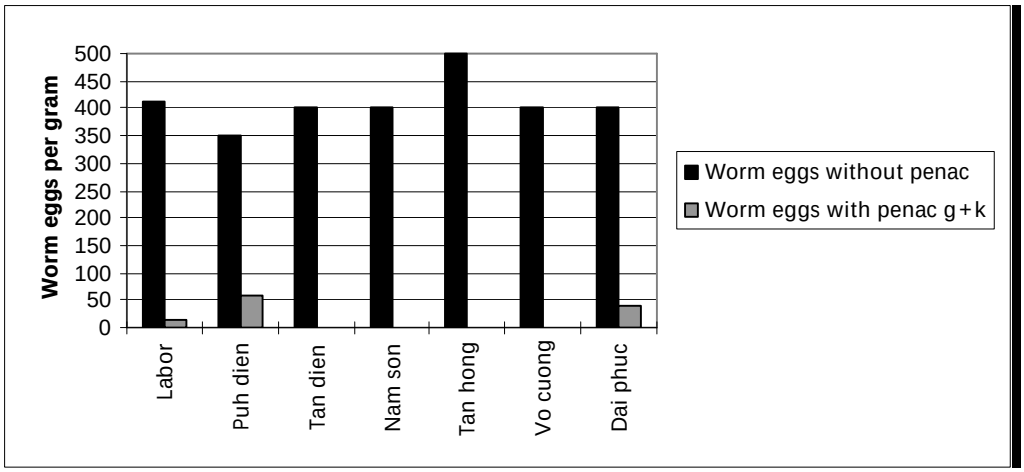

Figure 9 - Number of worm eggs of parasites

In all cases, a clear reduction of the pathogenic organisms in the composted dung could be noted after the addition of 20 g each penac g+k. The adjacent residents reported a significant reduction of smell and a lower humidity of the compost. In addition, the ammonia and hydrosulphide emissions were determined at different distances from the compost surface. The measurement results are shown in the following figures:

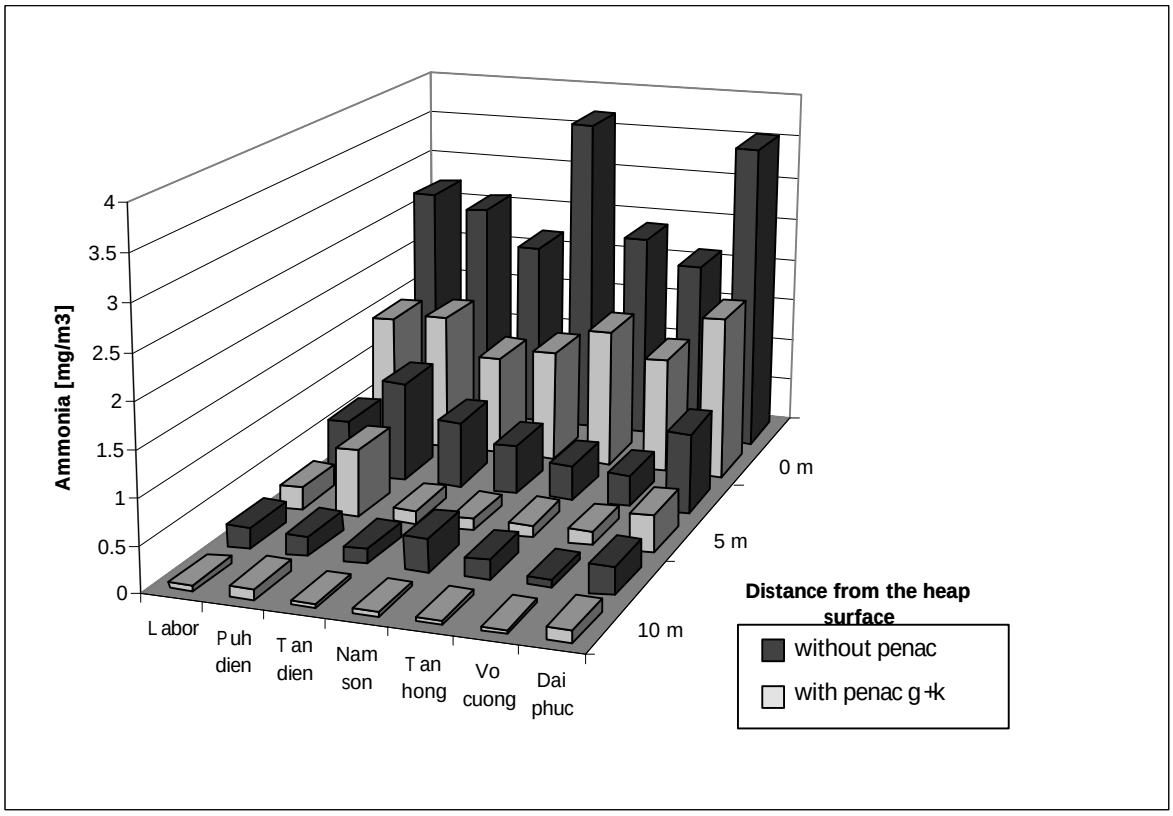

Figure 10 - Development of ammonia

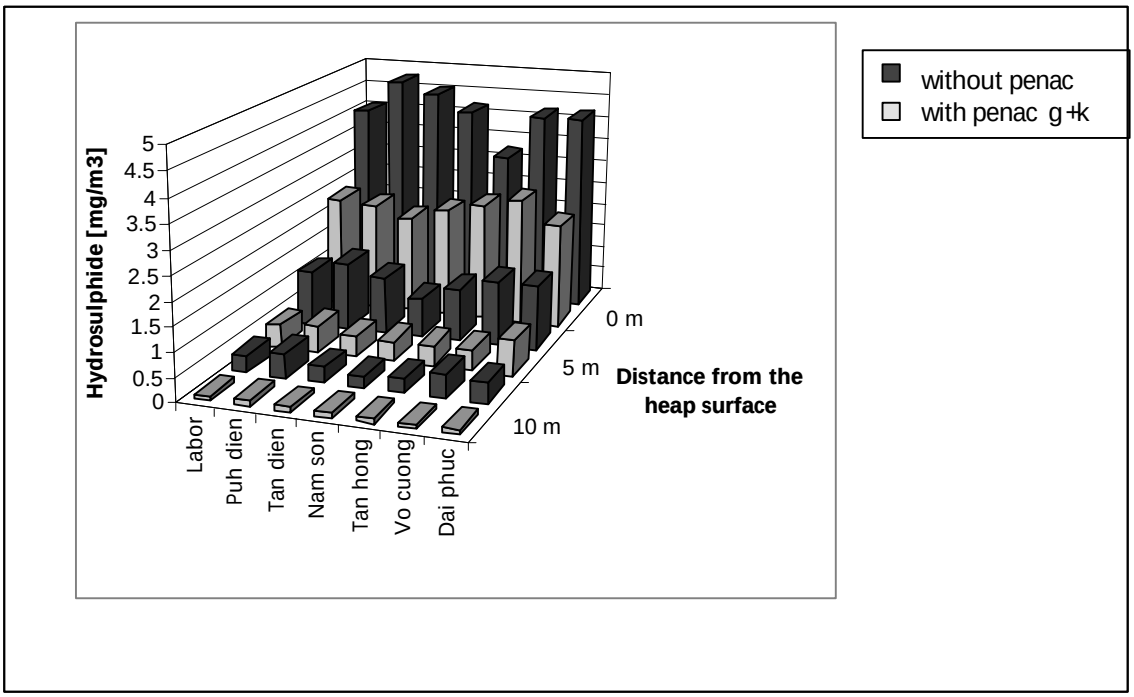

Figure 11 - Development of hydrosulphide

In order to check the manuring effect of the compost, 1 ha of area under cultivation of vegetables for each municipality was supplied with treated and untreated compost. As can be seen in the figure on the following page, the

areas supplied with treated compost showed better yields in all cases. Furthermore, a nitrate analysis showed a clear reduction of the nitrate content in the vegetables.

In the framework of an opinion poll with 240 questionnaires, the farmers concerned reported, apart from the reduction of bad smell, the following observation: if it rains, untreated compost causes an unpleasant itching at bare feet, which is not the case with the treated compost.

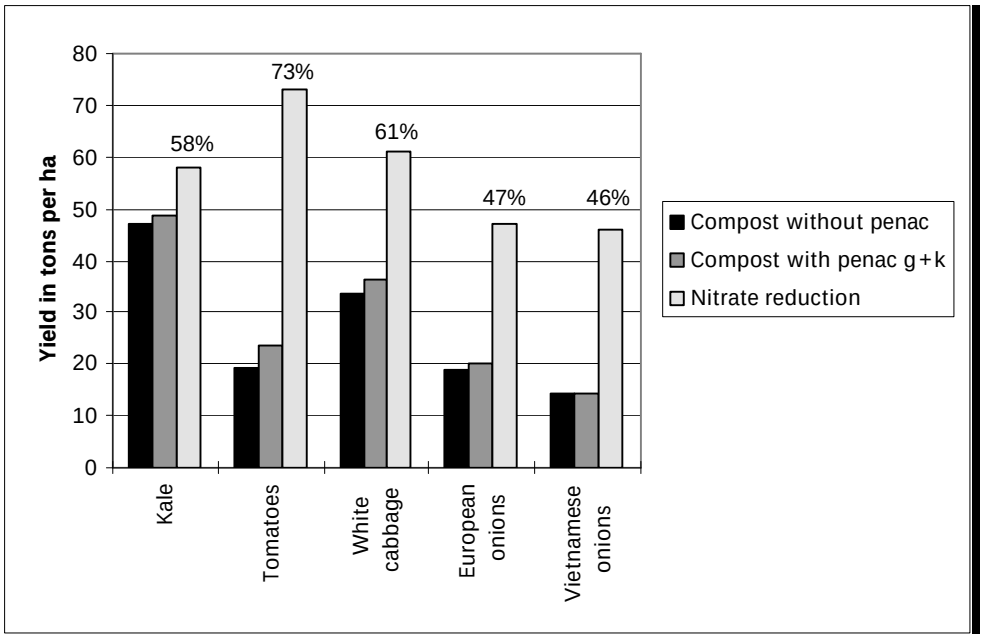

Figure 12 - Yield increase and nitrate reduction by means of penac compost

Plocher Tubes in Pond and Well Water

In 1994, a test regarding the treatment of pond and well water with Plocher tubes was performed at a pig fattening station in Taibinh. The results are summarised in the following table:

		NO_2 [mg/l]	NaCl [mg/l]	Cl [mg/l]	Coliforms per 100 ml	E. Coli per 100 ml
Well water	before	0.04	117.0	71.0	110×10^5	15×10^6
	after	0.01	81.7	49.7	230	40
Pond water	before	0.05	35.1	21.3	11×10^6	64×10^3
	after	0	23.4	14.2	12×10^3	43×10^3

The results with respect to faecal germs are significantly better in the well water than in the pond water. This is to be attributed to the fact that untreated pigs 'liquid manure continuously flow from the undertaking into the pond.