Effect of fertilizer formulas on some soil agrochemical indicators, growth and productivity

Q P Tran*, B X Khanh¹ and L T T Huong²

¹Centre for Applied Research and Technology Transfer, Institute of Science, Technology and Training, Kien Giang University, no 320A, route 61, Minh Luong town, Chau Thanh district, Kien Giang Province, Vietnam.
²Faculty of Mobilizing Farmers, School for Training and Fostering of the Vietnam Farmer’s Union, no 6B, Duong Khue, Mai Dich sub-district, Cau Giay district, Ha Noi, Vietnam

*E-mail: btxkhanh@vnkgu.edu.vn

Abstract. The experiment aimed at identifying and selecting primer fertilizer formulas included 1 control formula: 40 kg N + 90 kg P₂O₅ + 60 kg K₂O + 500 kg of powdered lime, 4 formulas of manure + control and 4 formulas of microbiological organic phosphate + The control was arranged in full randomized blocks and 3 repetitions, monitoring soil chemistry, growth and yield of peanut variety MD7. The results showed that the fertilizer formula influenced plant height from flowering to harvest, the number of leaves on the main stem, number and weight of nodules over time, the number of green leaves remaining when harvested, productivity, economic efficiency and indicators of soil agrochemical. The most suitable fertilizer formula is 1.4 tons of microbiological organic phosphate + control for 1 ha. However, the study recommends that the formula for fertilizing 1.1 tons of microbiological organic phosphate + control will yield the highest VCR ratio of 5.17 times. Adding microbiological organic phosphorus was more effective than equivalent formulas with manure.

1. Introduction
In order for plants to develop comprehensively, not only factors such as seeds, soil or water are needed, but fertilizer, especially fertilizer formula, is an indispensable ingredient. If soil is a source of nutrients, fertilization plays an equally important role when it comes to providing essential substances for plant growth [1]. For each type of tree, at a different time or area, it is necessary to have a suitable fertilizer formula for the plant to fully absorb the nutrients [2]. The right amount of fertilization, the right rate of plants needed for the growth and development process in each stage, each period of plant growth will bring efficiency back to the plant.

Because the pollution problem in rural areas is at an alarming level, not only from the widespread use of pesticides, but also a significant impact from the inappropriate use of chemical fertilizers [3]. Over-fertilization will put pressure on the ecosystem with major chemical residues of Nitrogen and Phosphorus in farmers’ farming activities. Chemical fertilization activities can have local environmental consequences such as soil inertness and erosion; at regional level such as groundwater pollution, change of surface water nourishment, change in resistance to pests and diseases; at the
global level, such as an increase in greenhouse gas emissions [4], [5]. Therefore, using organic fertilizers is the optimal solution today because it both reduces waste and provides nutrients for plants.

However, if only concerned with the use of traditional organic such as earlier, it would be completely inadequate and quality of quality is a difficult unknown. The statistics show that traditional organic fertilizers are estimated to only meet less than 20% of current organic fertilizer needs. The remaining 80% of demand can only be provided with industrial organic fertilizer sources [6]. Thus, industrial organic fertilizers can take on the role of a new organic fertilizer in the period of economic integration and commodity agriculture.

Currently, the country has more than 500 industrial organic fertilizer production facilities, with a total production of over 600,000 tons / year [6]. The basic advantages of industrial organic fertilizers compared to traditional organic fertilizers are high nutritional content, quite balanced and controlled nutritional, physical and chemical criteria, so the amount of fertilizer can be calculated fertilizer provides soil and crop. When considering the significance of the contribution in quantity, this is the type of fertilizer many times larger than the traditional fertilizer; There are also great differences in terms of physical, chemical, biological criteria as well as fertilizer quality [1], [7], [8].

Therefore, the study of choosing chemical fertilizers and adding traditional organic fertilizers or industrial organic fertilizers to come up with fertilizer formulas to suit the actual situation: Reduce environmental pollution, providing essential nutrients for plants, bringing economic efficiency and sustainable agriculture, controlled sources of nutrients in plants are essential and important.

2. Materials and methods
2.1. Materials

MD7 peanut variety was selected by the Vietnam Institute of Agricultural Science and Technology from a group of peanuts resistant to bacterial wilt disease imported from ICRISAT Institute (India) and China.

Fertilizers include chemical fertilizers: Urea (46.3% N), KCl (61% K2O), Super phosphate (20% P2O5), lime powder (CaO) available on the market, organic fertilizers are traditional manure (PC). PC is taken from farming households in the area and microbiological organic phosphorus fertilizer (PLHCVS) Song Huong of Song Huong Fertilizer Company (organic phosphorus 3%, organic matter 10%, horoscope organisms reach 5 million spores/g feces).

2.2. Methods
2.2.1. Time and place. The experiment was conducted on sandy soil at Tu Ha Crop Research Center, Huong Tra, Thu Thien Hue from February 2 to August 2, 2019. Soil nutrient composition (5.2 pH, 0.94% humus, 0.048% N, 0.021% of total P2O5, 3.80 mg/ 100 g easy-to-digest P2O5 soil).

2.2.2. Experimental layout. The experiment consisted of 9 formulas arranged in full randomized block method (RCBD) with 3 replicates, the area of the experimental plot was 10 m2 on the total area of 400 m2 and the planting density was 33 plants/ m2 with a distance of 30 x 10 cm (1 plant). Details are in Table 1.

2.2.3. Tracking indicators. Growth and yield data were collected in accordance with National Technical Regulation on the testing of peanut value and value (QCVN 01-57: 2011/ BNNPTNT).

Economic efficiency: Profit compared to the control (1000 VND/ kg) = Total revenue increased compared to the control (1000 VND/ kg) - Total expenditure increased compared to the control (1000 VND/ kg); Rate of return VCR (times) = Profit compared with the control (1000 VND/ kg) / Total expenditure increased compared to the control (1000 VND/ kg).

Soil digestibility: soil samples were taken at the 0-20 cm layer before and after the experiment and dried in the air and analyzed the following parameters; pHKCl by pH meter. The total nitrogen content (%) was performed according to the Kjeldahl method [9]. Determination of total humus by Tyurin
method [10]. Total phosphorus content P$_2$O$_5$ (%) was measured by the colorimetric method and determined by Kiecxanop method [11].

Table 1. Fertilizer formula in the experiment.

| Experimental formula | The amount of fertilizer for 1 ha |
|----------------------|----------------------------------|
| DC = Control         | 40 kg N + 90 kg P$_2$O$_5$ + 60 kg K$_2$O + 500 Kg powdered lime |
| CT2                  | DC + 9 tons PC                   |
| CT3                  | DC + 7 tons PC                   |
| CT4                  | DC + 5 tons PC                   |
| CT5                  | DC + 3 tons PC                   |
| CT6                  | DC + 1.4 tons PLHCVS             |
| CT7                  | DC + 1.1 tons PLHCVS             |
| CT8                  | DC + 0.8 tons PLHCVS             |
| CT9                  | DC + 0.5 tons PLHCVS             |

2.2.4. Data processing. Data were analyzed using statistical software Statistix 10.0 and Microsoft Excel 2013.

3. Results and discussion

3.1. Peanut tree height through periods

In general, tree height of all treatments increased over time. From after, the body grows quickly and then slowly. The true 3-leaf period or the seedling period where the growth and development of the plant mainly depend on the reserves of nutrients in the seeds and two eucalyptus leaves, not much depends on the fertilization regime so it does not make sense statistically. The period from flowering to the end of flowering requires a large number of nutrients to satisfy both vital activities: nutritional growth and real growth. Therefore, organic fertilizer formulas had an impact on main stem height ranging from 5.82 to 24.80 cm. In which formula CT6 has the largest tree height reaching 30.2 cm, followed by formula CT2 with 30.15 cm.

Thus, the effect of organic fertilizers on height growth is similar of Kamdi et al., [12] that the impact is only shown from the beginning of flowering, full flowering and the end of flowering. Organic fertilization has promoted the height of plants compared with no fertilization, while the PC.

Table 2. Effects of fertilizer formula on peanut height over time (unit: cm).

| Recipe | Seedlings | Flowering starts | Full bloom | Ends flowering | Harvest |
|--------|-----------|------------------|------------|----------------|---------|
| DC     | 2.93      | 5.82$^{a}$       | 10.09$^{a}$| 19.41$^{a}$    | 27.70$^{a}$ |
| CT2    | 3.10      | 6.26$^{abc}$     | 12.40$^{bc}$| 23.30$^{bcd}$  | 29.47$^{bcd}$ |
| CT3    | 3.09      | 6.22$^{abc}$     | 11.51$^{b}$| 22.98$^{bcd}$  | 29.22$^{bcd}$ |
| CT4    | 3.06      | 6.05$^{ab}$      | 11.46$^{b}$| 22.80$^{d}$   | 30.20$^{d}$  |
| CT5    | 2.96      | 6.03$^{ab}$      | 11.45$^{b}$| 21.82$^{b}$   | 28.73$^{ab}$ |
| CT6    | 3.13      | 6.52$^{c}$       | 12.78$^{c}$| 24.80$^{d}$   | 30.30$^{d}$  |
| CT7    | 3.12      | 6.33$^{bc}$      | 12.30$^{bc}$| 23.67$^{bcd}$  | 29.50$^{bcd}$ |
| CT8    | 3.08      | 6.16$^{abc}$     | 12.33$^{bc}$| 23.08$^{bcd}$  | 29.32$^{bcd}$ |
| CT9    | 2.97      | 6.08$^{abc}$     | 11.83$^{c}$| 22.40$^{bc}$  | 28.90$^{abc}$ |

In the same column, numbers with the same trailing letters did not differ statistically at 5%; DC: Chemical fertilizers; CT2 - CT5: DC + PC; CT6 - CT9: DC + PLHCVS.
levels being replaced by PLHCVS equivalent levels of investment value that the impact on plant height in these periods makes no difference. The higher the amount of organic fertilizer, the higher the tree height

3.2. Number of leaves over periods

A leaf is an important organ responsible for photosynthesis and organic matter synthesis for plant growth and development. In plants up to 90 - 95% organic matter is accumulated through photosynthesis from the leaves. At the same time, leaves are also the main part responsible for evaporation, promoting physiological and biochemical processes taking place in the plant body [13], [14]. Therefore, the study has tracked the number of leaves on the main stem over time and the number of green leaves remaining when harvested in Table 3.

Table 3. Effects of fertilizer formulation on the number of leaves and number of green leaves remaining at harvest (unit: leaves / stem).

| Recipe | Flowering starts | Full bloom | Ends flowering | Harvest | Number of green leaves remaining when harvested |
|--------|------------------|------------|----------------|---------|-----------------------------------------------|
| DC     | 7.00             | 9.30       | 11.53          | 17.97   | 4.63                                          |
| CT2    | 7.50             | 9.57       | 12.20          | 18.27   | 6.73                                          |
| CT3    | 7.33             | 9.57       | 12.17          | 18.13   | 5.57                                          |
| CT4    | 7.23             | 9.50       | 12.07          | 18.07   | 5.10                                          |
| CT5    | 7.13             | 9.37       | 12.00          | 18.11   | 5.03                                          |
| CT6    | 7.57             | 9.67       | 12.20          | 18.47   | 7.63                                          |
| CT7    | 7.37             | 9.57       | 12.17          | 18.31   | 6.10                                          |
| CT8    | 7.33             | 9.53       | 12.13          | 18.23   | 6.07                                          |
| CT9    | 7.23             | 9.47       | 12.00          | 18.18   | 5.90                                          |
| CV     | 2.41             | 1.18       | 1.75           | 0.80    | 15.79                                         |
| LSD 0.05% | 0.25 | 0.22 | 0.36 | 0.29 | 0.34                                          |

In the same column, numbers with the same trailing letters did not differ statistically at 5%; DC: Chemical fertilizers; CT2 - CT5: DC + PC; CT6 - CT9: DC + PLHCVS.

According to Dat [2], there are many benefits and good effects from balanced fertilization. Therefore, formulas with organic fertilizer added evenly gave the number of leaves on the main stem over time and the number of green leaves remaining after harvest was superior to the control without organic fertilizer. In which, formula 6 fertilizing 1.4 tons of PLHIV has the highest total number of leaves and green leaves in each period is 7.57; 9.67; 12.20; 18.47 and 7.63 main leaves/ stem were statistically significantly different from other treatments. This is consistent with the research of Hoang Van Tam, 2016 that the higher the amount of organic fertilization on a balanced level, the more leaves. However, in this study, the amount of PC was higher than PLHCVS, but the results were almost the same according to the proportion of dose of fertilization.

3.3. The number and volume of peanuts nodules over periods

Table 4 shows that the number and volume of nodules increased gradually from the beginning of flowering to the end of flowering, then gradually decreased to harvest. In particular, the organic fertilizer formulas have a higher number and weight of nodules than the control. Equation 6 shows superiority compared to the remaining formulas over all periods in number and volume of nodules. In addition, PC is somewhat inferior to PLHCVS in nodulation in terms of statistical significance. Compared with studies of Beattie, Hieu and Ty et al., [13], [15], [16] the number of nodules depends on the chemical and physical properties of the soil, and the fertilizer regime. The number of nodules can reach thousands of nodules (800 - 4000 nodules). Many basic studies have shown that for the
popular peanut varieties in Vietnam, there are usually about 300-400 nodules. This study produces roughly relative nodules for studies done over each period.

Table 4. The effect of formula on the number and volume of nodules over time.

| Recipe | Flowering starts | Full bloom | Ends flowering | Harvest | Flowering starts | Full bloom | Ends flowering | Harvest |
|--------|-----------------|------------|----------------|---------|-----------------|------------|----------------|---------|
| DC     | 79.80a          | 104.20a    | 164.60a        | 117.40a | 0.74a           | 1.07a      | 2.32a          | 1.53a   |
| CT2    | 135.60bc        | 181.40c    | 232.00cd       | 256.40ed| 1.17bc          | 1.60b      | 3.87cd         | 2.83cd  |
| CT3    | 118.60abc       | 175.60bc   | 281.60bc       | 220.60bc| 0.92ab          | 1.29ab     | 3.45bc         | 2.65bc  |
| CT4    | 97.80ab         | 170.80bc   | 278.00bc       | 197.20b | 0.85a           | 1.27ab     | 3.13b          | 2.31b   |
| CT5    | 94.40ab         | 129.60ab   | 237.20abc      | 184.40b | 0.77a           | 1.19ab     | 3.09b          | 2.28b   |
| CT6    | 155.20c         | 256.40d    | 373.60d        | 289.20d | 1.27c           | 2.44c      | 4.24d          | 3.28c   |
| CT7    | 128.20bc        | 172.40c    | 287.20bc       | 236.40bcd| 0.95b           | 1.37bc     | 3.98cd         | 3.11de  |
| CT8    | 110.20ab        | 139.80abc  | 254.80ab       | 196.80b | 0.87a           | 1.35ab     | 3.37bc         | 2.74c   |
| CT9    | 91.60ab         | 130.60ab   | 252.80ab       | 188.60b | 0.82a           | 1.29ab     | 3.11b          | 3.22b   |
| CV (%) | 21.55           | 27.14      | 21.13          | 23.40   | 19.31           | 28.30      | 17.06          | 20.44   |
| LSD 0.05% | 44.02          | 48.48      | 86.16          | 58.16   | 0.21            | 0.43       | 0.65           | 0.33    |

In the same column, numbers with the same trailing letters did not differ statistically at 5%; DC: Chemical fertilizers; CT2 - CT5: DC + PC; CT6 - CT9: DC + PLHCVS.

3.4. Productivity peanuts

The above data shows that when the fertilizer dose is increased, the total number of fruits, number of firm fruits, actual yield and theoretical yield also increased compared to the control, respectively 0.23-3.3 fruits, 1.43-3.8 fruits, 11.14 - 52.42% and 14.15 - 41.08%. However, the weight of 100 fruits depends much on the genetic characteristics of the variety, so there is no difference in significance between experimental formulas through statistical analysis. In which, formula 6 fertilized 1.4 tons of microorganism organic phosphate with the highest yield compared to the remaining formulas. In addition, there is no significant difference in the yield of plants between the replacement levels of PLHCVS in terms of investment value and PC fertilization formulas.

Table 5. Effects of PC and PLHCVS on factors constituting peanut yield.

| Recipe | Total number of fruits/ tree (fruit) | Number of firm fruits/ tree (fruit) | Weight of 100 fruits (g) | Theoretical yield (kg/ha) | Actual yield (kg/ha) |
|--------|--------------------------------------|-------------------------------------|--------------------------|---------------------------|---------------------|
| DC     | 16.50a                               | 11.70a                              | 107.27                   | 2933a                     | 2047a               |
| CT2    | 18.67bc                              | 15.37bc                             | 107.82                   | 4101cd                    | 3080d               |
| CT3    | 17.03bc                              | 13.23bc                             | 105.75                   | 3522ab                    | 2880bcd              |
| CT4    | 16.97cd                              | 13.17abc                            | 103.89                   | 3385ab                    | 2397abc              |
| CT5    | 16.73a                               | 13.13abc                            | 102.99                   | 3348ab                    | 2275ab               |
| CT6    | 19.80c                               | 15.50c                              | 107.88                   | 4138d                     | 3120d               |
| CT7    | 19.17bc                              | 14.77bc                             | 106.58                   | 3895bcd                    | 2980cd               |
| CT8    | 18.37bc                              | 14.30bc                             | 104.13                   | 3686bcd                    | 2433abc              |
| CT9    | 18.03abc                             | 14.03abc                            | 104.01                   | 3612bcd                    | 2293abc              |
| CV (%) | 6.96                                 | 8.82                                | 6.93                     | 10.64                      | 15.41                |
| LSD 0.05% | 2.4237                          | 2.3491                              | 6.0624                   | 6.4149                     |                     |

In the same column, numbers with the same trailing letters did not differ statistically at 5%; DC: Chemical fertilizers; CT2 - CT5: DC + PC; CT6-CT9: DC + PLHCVS.
3.5. Economic efficiency

The application of organic fertilizers is more profitable than the control chemical fertilizers only. Especially, when increasing the dosage of organic fertilizers, the profits will increase. This study agrees with the study of Chinh and Nien [17] that fertilizing more fertilizer and increasing dosage to a balanced level gives higher profit. In which, formula 6 added 1.4 tons of PLHCVS with the highest profit of 7,044,000 VND / ha compared to the control (Table 6). Although the amount of PC fertilization is higher than PLHCVS and total expenditure is also higher, the profit of peanut production when applying organic fertilizer is better. Thus, the study can see the advantages of the application of additional PLHCVS: low fertilizer, low cost, reduced labor, easy purchase, physical and chemical control in fertilizer.

Table 6. Influence of PC and PLHCVS phosphate on economic efficiency of peanut production.

| Recipe | Yield increase compared to control (kg/ha) | Peanut selling unit price (1000 VND/kg) | Total revenue increased compared to control (1000 VND/ha) | Total expenditure increased compared to control (1000 VND/ha) | Profit compared to the control (1000 VND/ha) | Return VCR (times) |
|--------|---------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------|------------------|
| DC     | -                                           | -                                       | -                                                        | -                                                        | -                                           | -                |
| CT2    | 1033                                        | 8                                       | 8264                                                     | 1800                                                     | 6464                                        | 3.59             |
| CT3    | 833                                         | 8                                       | 6664                                                     | 1400                                                     | 5264                                        | 3.76             |
| CT4    | 350                                         | 8                                       | 2800                                                     | 1000                                                     | 1800                                        | 1.80             |
| CT5    | 228                                         | 8                                       | 1824                                                     | 600                                                       | 1224                                        | 2.04             |
| CT6    | 1073                                        | 8                                       | 8584                                                     | 1540                                                     | 7044                                        | 4.57             |
| CT7    | 933                                         | 8                                       | 7464                                                     | 1210                                                     | 6254                                        | 5.17             |
| CT8    | 386                                         | 8                                       | 3088                                                     | 880                                                      | 2208                                        | 2.51             |
| CT9    | 246                                         | 8                                       | 1968                                                     | 550                                                      | 1418                                        | 2.58             |

DC: 90 kg P₂O₅ + 40 kg N + 60 kg K₂O + 500 Kg powdered lime; CT2: DC + 9 tons PC; CT3: DC + 7 tons PC; CT4: DC + 5 tons PC; CT5: DC + 3 tons PC; CT6: DC + 1.4 ton PLHCVS; CT7: DC + 1.1 ton PLHCVS; CT8: DC + 0.8 ton PLHCVS; CT9: DC + 0.5 ton PLHCVS.

The Value Cost Ratio (VCR) is the ratio between the value of the residual yield of fertilizer and the fertilizer cost. This ratio is usually from 1-10 but should apply at least 2, meaning that the value of the surplus product obtained must be at least twice the investment cost and VCR > 2 for production to be profitable, VCR ≥ 3 the producers will be attractive [18]. From the calculation results in Table 8, it shows that the organic fertilizer formulas all have VCR > 2 except for the lowest formula 4 (VCR = 1.80), which proves that the investment in PLHCVS for peanuts brings interest. But in formula 7, fertilizing 1.1 tons of PLHIV is still more attractive to farmers (VCR = 5.17). In formula 6, fertilizing 1.4 tons of PLHCVS for high yield (VCR = 4.57). Equations 2 and 3 have quite high VCR, although not higher than equivalent treatments for PLHCVS, but higher than formulas 8 and 9. All the treatments of PLHCVS have higher VCR than the PC-fertilizing formulas equivalent.

3.6. Norm of soil agro-chemical

During the life, plants are often taken from the soil essential nutrients to supply the growth and development needs of plants. For peanuts after a harvest with a yield of 0.1 tons of tubers, 2 tons of peanut stalks, 64 kg of nitrogen, 11 kg of phosphate, and 46 kg of pure potassium were taken from the soil [19], [20]. Therefore, in order for plants to grow and develop well, it is necessary to regularly compensate for soil nutrients. The problem here is how to fertilize to maintain soil fertility while providing adequate amounts of nutrients to meet the needs for the growth and development of plants.
Table 7. Some indicators of soil agrochemical before and after the experiment.

| Recipe | pH KCl | Humus (%) | N (%) | P$_2$O$_5$ total (%) | P$_2$O$_5$ is easy to digest (mg/100 g of soil) |
|--------|--------|-----------|-------|----------------------|-----------------------------------------------|
| Before | 5.2    | 0.94      | 0.05  | 0.021                | 3.80                                          |
| DC     | 5.40   | 1.04      | 0.07  | 0.025                | 3.84                                          |
| CT2    | 5.90   | 2.41      | 0.09  | 0.047                | 6.46                                          |
| CT3    | 5.70   | 2.20      | 0.09  | 0.040                | 5.83                                          |
| CT4    | 5.70   | 1.98      | 0.09  | 0.037                | 5.16                                          |
| CT5    | 5.60   | 1.56      | 0.08  | 0.030                | 4.44                                          |
| CT6    | 5.80   | 2.71      | 0.10  | 0.067                | 9.58                                          |
| CT7    | 5.50   | 2.67      | 0.09  | 0.064                | 6.55                                          |
| CT8    | 5.60   | 2.54      | 0.09  | 0.055                | 6.33                                          |
| CT9    | 5.50   | 2.48      | 0.08  | 0.051                | 5.70                                          |

DC: 90 kg P$_2$O$_5$ + 40 kg N + 60 kg K$_2$O + 500 Kg powdered lime; CT2: DC + 9 tons PC; CT3: DC + 7 tons PC; CT4: DC + 5 tons PC; CT5: DC + 3 tons PC; CT6: DC + 1.4 tons PLHCVS; CT7: DC + 1,1 tons PLHCVS; CT8: DC + 0.8 tons PLHCVS; CT9: DC + 0.5 tons PLHCVS.

Through the analysis results in Table 7 shows that before the experiment, all the indicators were in the poverty level and very poor in nutrition, the soil was very acidic and after the experiment, all the indicators were improved soil structure status. The humus glue binds the soil particles together to form good, stable grains, making the soil clear to avoid scum formation and erosion. Improve soil physics, chemistry and biology, make soil porous, aerate, stabilize pH, keep soil moist, increase drought resistance for crops. Creating favorable conditions for microorganisms to work in the soil, helping the roots and plants grow well. Contribute to accelerating the process of decomposition of inorganic and organic compounds into nutrients that are easy to digest N, P, K, medium, micronutrients for plants to grow and develop. At the acidity pH KCl, the organic fertilizer formulas were all higher than the control formulas and before the experiment ranged from 5.5 - 6.5, within the limits suitable for the growth and development of the variety. lost. Similar to humus, the content of nitrogen, total phosphorus and easy-to-digest phosphorus also showed a good effect when adding organic fertilizers would promote chemical reactions, improve oxidation conditions, associated with mobility, and precipitation of inorganic elements in soil. Organic fertilizers increase the adsorption capacity of the soil, retain nutrients, and increase the buffering capacity of the soil. Therefore, formula 6 affects the agro-soil parameters of the soil the most. The formulas with added PLHCVS fertilization have a better effect than equivalent PC.

In comparison to before the experiment, after the experiment, the nutrient content of the soil improved partly thanks to the fertilizer formula. All organic fertilizer formulas have high levels of organic matter compared to the control formula, which is most clearly shown in the two indicators of humus and total nitrogen. In addition, the PLHCVS fertilizer formula also has higher total phosphorus and easily digestible phosphorus than the PC fertilization formula, especially in the formula of 1.1 and 1.4 tons of PLHCVS. This measurement can be confirmed at lower investment levels such as PLHCVS not only increasing peanut yield, but also contributing to improving soil fertility.

4. Conclusions
Fertilizer formulas have influenced the soil, growth and yield of peanuts MD7. Plant height, number of leaves over time, number and volume of nodules, yield, economic efficiency and soil agrochemical indicator tend to increase when fertilizer dosage increases and reaches the highest rate in the public. However, the highest VCR was in formula 7 (40 kg N + 90 kg P$_2$O$_5$ + 60 kg K$_2$O + 500 Kg of lime powder + 1.1 tons of PLHCVS) per 1 hectare. In addition, formulas with supplemented PLHCVS can replace PC at levels with nearly the same value.
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