CLAIMS

What is claimed is:

1. A method for enzymatically producing high-activity bio-organic fertilizer, comprising the following steps:

(1) Pretreatment of waste protein substances: adding protease to the waste protein substances to give the fermentation materials;

(2) Activation of fermentation strains: activating *Bacillus subtilis*, lactic acid bacteria and *Trichoderma* respectively and combining them; and the number of effective viable bacteria after the combination is ≥40 million cfu/g;

(3) Fermentation: mixing the fermentation materials obtained in step (1) with the activated bacteria obtained in step (2), and carrying out the fermentation; when the temperature is below 40°C, carrying out the second addition of bacteria.

2. The method according to claim 1, wherein before adding the protease in step (1), a fermentation substrate is added; the fermentation substrate is one or more selected from the group consisting of edible fungus chaff, rice bran, grain chaff, peanut bran, soybean meal, sugarcane straw powder and mushroom residue; preferably is one or more selected from the group consisting of edible fungus chaff, rice bran, peanut bran and soybean meal;

preferably, the mass ratio of the waste protein substances to the fermentation substrate(s) is 1:(1~3); more preferably is 1:(1.2~2.5).

3. The method according to claim 1, wherein the protease is an alkaline protease.

4. The method according to any one of claims 1 to 3, wherein the addition amount of the protease in step (1) is 0.08% to 0.15% of the mass

of the waste protein substances, preferably is 0.10% to 0.12%.

5. The method according to any one of claims 1 to 3, wherein before adding protease in step (1), the waste protein substances are boiled with alkali; preferably, the mass concentration of the alkali is 0.03% to 0.08%, more preferably is 0.05% to 0.08%; further preferably, the boiling time is 25 to 40 minutes, more preferably is 30 to 35 minutes.

6. The method according to any one of claims 1 to 3, wherein the mass ratio of carbon to nitrogen in the fermentation materials is (20~30):1, preferably is (25~28):1, more preferably is 25:1; further preferably, the moisture content of the fermentation materials is 58% to 68%, more preferably is 60% to 65%.

7. The method according to any one of claims 1 to 3, wherein in step (2), *Bacillus subtilis* is proliferated with NB culture medium, lactic acid bacteria are proliferated with MRS culture medium, and then respectively added to the composition of bran and soybean meal to expand and activate; and *Trichoderma* is added to the combination of bran and soybean meal to activate.

8. The method according to claim 7, wherein the moisture content of the composition of bran and soybean meal is 50% to 70%, and the mass ratio of bran to soybean meal is (8~10):1.

9. The method according to any one of claims 1 to 3, wherein the second addition of bacteria in step (3) is carried out by adding one or more bacteria selected from the group consisting of *Bacillus subtilis*, *Bacillus mucilaginosus*, *Bacillus amyloliquefaciens*, *Streptomyces fradiae* and photosynthetic bacteria; preferably, *Bacillus subtilis*, *Bacillus mucilaginosus*, *Bacillus amyloliquefaciens* and *Streptomyces fradiae* can be added after activation with NB culture medium, and photosynthetic

bacteria can be sprayed directly.

10. A high-activity bio-organic fertilizer produced by the method according to any one of claims 1 to 9.