

регулювання 13 і 14 відносно площин змінюються розміри щілин на торцях пакетів 1 (рис.2), через які повітряний потік виходить або заходить між фрикційні поверхні пакетів 1, тим самим змінюється швидкість повітряного потоку, а значить, і швидкість транспортування компонентів насіннєвих сумішей, що сепаруються.

Збільшення таким чином швидкості транспортування компонентів на фрикційних поверхнях (при незмінному режимі вібрації фрикційних поверхонь) дозволяє збільшувати подачу вихідного матеріалу на фрикційні площини, що призводить до збільшення продуктивності вібросепаратора без зниження якості розділення.

Висновки. Внаслідок інтенсифікації процесу розділення компонентів вихідної суміші на неперфорованих фрикційних робочих поверхнях передбачається підвищення продуктивності запропонованого вібросепаратора. Але виникає необхідність дослідити показники ефективності процесу через наявність додаткового впливу повітряного потоку на режим руху компонентів насіннєвої суміші на робочих поверхнях.

Список використаної літератури:

1. Заика П.М., Мазнев Г.Е. Сепарация семян по комплексу физико-механических свойств.- М.: Колос, 1978. 286с.
2. А.С. № 15553206 СССР В07В12/46. Вибросепаратор для очистки семян от примесей / Заика П.М., Козаченко А.В., Завгородний А.И., Богомолов А.В.. Опубл. 1990, Бюл. № 12. 4с.
3. Патент на КМ 131889 України МПК В07В13/00 Пристрій для керування процесом сепарації насіння на віброфрикційному сепараторі / Бакум М.В., Михайлов А.Д., Козій А.Б., Лук'яненко В.М., Кречот М.М. Опубл. 11.02.2019, Бюл. № 3. 4с.

УДК 631.363

GRANULATED FERTILIZERS FROM LIVESTOCK WASTE

Skliar O.G., Ph.D. Eng.; Tatianenko V.O., student

(Dmytro Motornyi Tavria state agrotechnological university, Melitopol, Ukraine)

During the period of their growth, agricultural plants absorb dozens of different chemical elements from the soil. To partially replenish these losses, agricultural enterprises usually add mineral fertilizers to the soil. As

a rule, these fertilizers return only the three most important elements to the soil: nitrogen, phosphorus, potassium. The remaining losses are not compensated. For this reason, every year the fertility of the soil decreases at a high rate with ever-increasing rates of application of mineral fertilizers [1,2].

But since nutrients in manure are in organic form, they are less washed out of the soil, entering it gradually, over a long period, without creating a high concentration of salts. This increases not only the harvest, but also its quality (the content of vitamins, sugars, proteins, starch increases, and nitrites do not accumulate). Phosphorus in manure is represented mainly by organic compounds, so it is practically not fixed in the soil in the form of iron, aluminum or calcium phosphates, and as the organic matter is mineralized, it is absorbed by plants. For this reason, the phosphorus of manure is used better compared to the phosphorus of mineral fertilizers. A similar situation is with nitrogen. The amount of available nitrogen in granulated pig manure reaches 100%, phosphorus – 70%, potassium – 90%. The fertilizer contains calcium, which helps to deacidify the soil. When in contact with water, manure granules swell, increasing in size several times. When there is a lack of water in the soil, they slowly release this moisture, providing plant roots and microorganisms with better conditions during short-term droughts.

Manure is a by-product of animal husbandry. Animals secrete this product several times more by weight than meat. An increase in the number of new and increasing capacities of existing livestock farms leads to a complication of the ecological situation. At the same time, manure can be turned from a problem into a valuable product - organic fertilizers [2].

But there are several obstacles to the large-scale application of this absolutely correct solution:

- 1) wet (fresh) manure contains a large amount of harmful microflora, helminth eggs and weed seeds, so manure cannot be used fresh as a fertilizer [3]. To ensure safety, these harmful components must be destroyed. For this purpose, most often the droppings are left to ripen naturally, less often - the process is accelerated by the use of special microflora, enzymes and (or) catalysts. This technology has a cyclic nature and a number of other serious technical shortcomings, so it has not yet found mass application, despite the urgency of the problem.

- 2) the problem of storage, transportation and uniform introduction into the soil. In a wet state, manure is extremely difficult to store, too expensive to transport (transportation of water), and there are practically no methods and mechanisms for its uniform distribution over the soil surface. In addition, work on applying fertilizers to the soil is seasonal, while the

supply of manure is continuous.

In this regard, the development of highly effective technologies [3] that ensure the guaranteed production of sterile and neutralized organic fertilizers based on manure is of great importance in matters of increasing soil fertility, nature protection, preserving animal health, and improving the safety of service personnel, population health and profitability of production.

Description of the main principles and technology of the line. The line is designed for receiving, accumulating, metered feeding, drying, grinding and granulating manure.

Manure effluents are pumped for mechanical removal of excess moisture to a press-screw separator [4]. The solid fraction is poured into the mechanized composition of the "living bottom", and the liquid enters the lagoon and is reused for washing manure. In addition, further processing of this substance to obtain liquid fertilizers is possible. Such technology has been developed, patented and already implemented by many enterprises abroad. The obtained solid fraction enters the raw material bunker for further processing. The line allows you to produce pellets with indicators that meet the requirements of European standards.

When preparing a dry product for granulation, a certain amount of substances that increase NPK indicators can be added to it. The amount of these substances is limited by the technological features of granulation processes. In the production of non-granular (powder-like) fertilizers, the NPK levels can be adjusted to any set parameters without any restrictions.

However, not all enterprises remove manure by water washing. Some agricultural enterprises use the bedding method of keeping animals with mechanical manure removal. Straw is mainly used as litter. At the same time, the moisture content of manure is about 75%. When processing such manure, it is also necessary to remove excess moisture from it before drying [5]. However, it is impossible to remove excess moisture from litter manure when the length of litter straw is more than 15 mm with a screw separator. But scientists, after testing different methods of separation, proved that the most real and effective method is the use of a screw separator.

In this regard, preparation for the production of fertilizers should be carried out at the stage of litter preparation. Litter straw must be chopped to a length of no more than 15 mm before use.

Many enterprises have large reserves of compacted manure. Its processing has some features. The settled manure has a moisture content below 55% and does not require separation. However, it must be crushed before granulation to obtain a homogeneous mass.

The process of processing manure into organic fertilizer is continuous. The average time for raw materials to pass through the technology – from manure runoff to the finished product – is about 1 hour. This fact is an advantage over technologies that use a cyclic (periodic) process [5].

Sections in their work are conditionally independent, and are separated from each other by intermediate compositions. This allows you to ensure uninterrupted work in case of technological interruptions, regulations and other situations.

As a result of the conducted research, it was found that in the practical activities of agricultural enterprises, first of all, attention should be paid to the implementation of environmentally safe technologies in the use of manure (excrement), which will not only reduce harmful emissions into the environment, but also bring additional profit.

Bibliography

1. Komar A. About granulation of bird droppings. *Технічне забезпечення інноваційних технологій в агропромисловому комплексі: Мат. І Міжнар. наук.- практ. конф. мол. учених*. Мелітополь: ТДАТУ, 2021. С. 180. URL: <http://www.tsatu.edu.ua/tsst/wp-content/uploads/sites/6/komar-2-2021.pdf>.
2. Skliar O.G., Skliar R.V Substrate management in biogas plants. *Молодь і технічний прогрес в АПК: Мат. Міжнародної науково-практичної конференції*. Том 2. Інноваційні розробки в аграрній сфері. Харків: ХНТУСГ. 2021. С. 260-262.
3. Войтов В.А. Аналіз технологій утилізації відходів птахівництва за кордоном. *Праці ТДАТУ*. Вип. 19, т. 4. Мелітополь: ТДАТУ, 2019. С. 100-109. DOI: 10.31388/2078-0877-19-4-100-109.
4. Skliar R. Justification of conditions for research on a laboratory biogas plan. *Motrol: Motoryzacja I Energetyka Rolnictwa*. Vol. 16, No 2. P. 183-188.
5. Рева В.С. Типи і оцінка пресувального обладнання. *Матеріали І Міжнар. наук.-практ. Інтернет-конференції «Технічне забезпечення інноваційних технологій в агропромисловому комплексі»*. Мелітополь: ТДАТУ, 2020. С. 210-213.