**Terms of Reference" (ToR)**

**Creation of Demonstration Units for Organic Origin Fertilizers at the Balahovit Teaching-Experimental Farm of the Armenian National Agrarian University, located in Balahovit, Kotayk region**

The Armenian National Agrarian University invites qualified organizations to provide a price offer for the services presented below within the framework of the project “Introduction of a Circular Agri-food Model in Armenia,” at the Teaching-Experimental Farm of Balahovit, ANAU.

The Armenian National Agrarian University is implementing the measure “Introduction of a Circular Agri-food Model in Armenia” in the Teaching-Experimental Farm of Balahovit, Republic of Armenia with the support of ECOserve Armenia Programme implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ).

The constituent parts of this statement are:

**Description of the service provided.**

**Participation criteria and evaluation procedure.**

* + Any legal entities registered in Armenia can submit an application.
  + The applicant can act as a joint activity (JA), in case all members are jointly responsible for the full implementation of the contract.
  + The contract will be awarded based on the principle of giving preference to the bidder who has submitted the lowest price offer among the bids evaluated as satisfactory.

Content of the submitted application

The applicant must include in his/her application:

* The cost of the bid signed by the participant for ALL lots. The price offer should include all payments required to ensure the performance of the contract, including taxes, duties, fuel, labor calculations, etc.
* The application will be considered accepted when one proposal is submitted for ALL lots.
* A copy of the certificate of registration in the State Register of Legal Entities.
* Documents certifying the applicant's experience in this field.

**Application submission procedure**

* The application can be submitted in both paper and electronic versions until August 17 of this year by 12:00 PM to the Armenian National Agrarian University Foundation, located at 74 Teryan, Yerevan, RA. Alternatively, you can send the application to [hovh.anna.isyan@gmail.com](mailto:hovh.anna.isyan@gmail.com).
* The "Armenian National Agrarian University" Foundation reserves the right to accept or reject any bid and to cancel the tender process, rejecting all bids at any time before awarding the contract, without imposing any obligation on the bidder(s) or without explaining the Foundation's actions to the bidder(s).
* In case of any questions, you can contact the Program Coordinator at [hovh.anna.isyan@gmail.com](mailto:hovh.anna.isyan@gmail.com) or call +37494 48 87 85.

**Description of the service provided**

The plan is to establish a demonstration unit to produce organic origin fertilizers at the Balahovit Teaching-Experimental Farm in Balahovit, Kotayk region.

Demonstration units for production of organic origin fertilizers by lots

[LOT 1: Organization of a demonstration unit using microorganisms to obtain dry and liquid fertilizers 2](#_Toc142347075)

[LOT 2. Setting up a demonstration unit using vermicomposting (Californian red worms) technology to produce dry compost 5](#_Toc142347076)

[LOT 3. Setting up a demonstration unit with simple composting technology to produce dry compost 6](#_Toc142347077)

[LOT 4. Compilation of educational guide titled "Establishing and Organization of Production of Organic Origin Fertilizers" 7](#_Toc142347078)

# LOT 1: Organization of a demonstration unit using microorganisms to obtain dry and liquid fertilizers

**Description**

The production will be carried out on open ground, with an area of 3m x 2m x 3m, where at least 10 cubic meters of fresh manure will be accumulated. Approximately 100 grams of microorganisms with a density of 109 will be evenly distributed on the accumulated manure. The resulting mass should be maintained at 60% - 70% humidity for up to 2 months at a temperature of 25°C. It should be mixed using a tractor every 10 days to ensure proper air access. Within 2 months, at least 6 laboratory samplings should be carried out, with a periodicity of 10 days, to determine the degree of mineralization. The list of laboratory samples for agrochemical analysis can be found in Table 1. Based on the dry fertilizer with microorganisms, liquid fertilizer will be produced, which can be applied through foliar and drip feeding methods.

|  |  |  |
| --- | --- | --- |
| Table 1: List of laboratory sampling for agrochemical analysis | | |
| N | **ID** | Name |
| 1 | NO3- | Nitrate nitrogen |
| 2 | NH4+ | Ammonium nitrogen |
| 3 | P2O5 | Phosphorus |
| 4 | K2O | Potassium |
| 5 | Fe | Iron |
| 6 | Zn | Zinc |
| 7 | Cu | Copper |
| 8 | Cl- | Chlorine |
| 9 | Mn | Manganese |
| 10 | Mo | Molybdenum |
| 11 | SO42- | Sulfate |
| 12 | B | Boron |
| 13 | CO2 | Carbonate |
| 14 | Ca2+ | Calcium |
| 15 | Mg2+ | Magnesium |
| 16 | EC | Electrical conductivity (amount of dissolved salts) |
| 17 | pH | Hydrogen indicator |
| 18 | %C | Organic matter (humus) |
| 19 |  | Determination of humic acids in the dissolved mass |
| 20 |  | Water permeability |
| 21 |  | Detection of nematodes |
| 22 |  | Sampling |

|  |  |  |  |
| --- | --- | --- | --- |
| Table 2: Necessary requirements for applied microorganisms | | | |
| Basic characteristics | | The results | |
| Appearance | | Dust | |
| Homogenity | | Homogenic | |
| Smell | | Special | |
| Color | | Light brown | |
| Solubility | | Standard | |
| Ingredients | **Mass, %** | | The results |
| Microbial part | 1% | | Guaranteed by the manufacturer |
| Remnants of filtrate | At least 1% | | Guaranteed by the manufacturer |
| Fillers | 98%-99% | | Guaranteed by the manufacturer |
| Microbiology | Norms | | The results |
| Intestinal pathogens: Salmonella, Shigella | Absence in 25g | | Missing, according to the results of the experiment |
| Titer | No less than 1 trillion cells in  1g of agen, 1010 CFU (colony-forming units)/g | | 1.5 x 1010 CFU/g |
| The bacterial agent is a mixture of 5 strains of Bacillus[[1]](#footnote-1) type aerobic bacteria. | | | |
| Bacillus amyloliquefaciens VA27  Bacillus amyloliquefaciens VA31  Bacillus subtilis VA34  Bacillus subtilis VA44  Bacillus subtilis VA46 | | |  |

List of necessary items.

|  |  |  |  |
| --- | --- | --- | --- |
| N | Name of item/operation | Unit of measure | Quantity required |
| 1 | Tractor service/initial hauling and mixing | hour | 50 |
| 2 | Provision of water supply from a source 50m away | meter | 50 |
| 3 | Laboratory sampling | Package | 6 |
| 4 | Microorganisms | package | 1 |
| 5 | 500 l polymer container | Pcs | 3 |
| 6 | 100 l polymer container | Pcs | 3 |
| 7 | Electric mixer with a capacity of 2 kW | Pcs | 1 |
| 8 | Press | Pcs | 1 |

# LOT 2. Setting up a demonstration unit using vermicomposting (Californian red worms) technology to produce dry compost

**Description**

To obtain vermicompost, it is necessary to prepare a basin/container with a volume of 1.5m x 4.0m x 0.8m under the cover, which will be divided equally into 2 parts: 1.5m x 2.0m x 0.8m. The purpose is to receive the vermicompost in a separate section and then transfer the Californian red worms to the other part of the basin, where it will be filled with fresh raw material for composting.

In this technology, Californian red worms will be used, which originated from the American state of California when, in 1959, the American scientist George Barrett obtained this type of worms. Californian red worms are hermaphrodites.

After the third month of life, California red worms begin to reproduce once every 7-8 days. After fertilization, two worms form one pod each. There can be 2-20 generations inside the pods. The pods ripen in 14-21 days, depending on environmental conditions.

Technical requirements for Californian red worms can be found in Table 3.

|  |  |  |
| --- | --- | --- |
| Table 3: Technical requirements for Californian red worms | | |
| N | Index | Californian red worms |
| 1 | Size of a mature worm's body | 6-10 cm long, 0.3-0.5 cm diameter, 1-1.5 g of body mass |
|  |  |  |
| 2 | The body temperature | 19°C -20°C |
| 3 | Activity | Active |
| 4 | Malnutrition behavior | Active |
| 5 | Vital function | Active from +8°С to +40° |
| 6 | Puberty | About 100 days |

List of necessary supplies

|  |  |  |  |
| --- | --- | --- | --- |
| N | Name of item/operation | Unit of measure | Quantity required |
| 1 | 1.5m x 4.0m x 0.8m basin/container, divided into two parts: 1.5m x 2.0m x 0.8m | Item | 1 |
| 2 | Rake | Pcs | 5 |
| 3 | Shovel | Pcs | 5 |
| 4 | Californian worms | Pcs | 10,000 |

# LOT 3. Setting up a demonstration unit with simple composting technology to produce dry compost

**Description**

Simple composting requires 3 wooden, air-tight one-cubic m bins and a small twig grinder. The branches should be ground and mixed with the composting raw material as a structural material to allow air access.

|  |  |  |  |
| --- | --- | --- | --- |
| N | Name of item/operation | Unit of measure | Quantity required |
| 1 | Wooden box | Item | 3 |
| 2 | Electric sawmill  GHE 135 L / 140 L  Capacity: 2300 W / 40 rpm  Maximum thickness of branches: 0mm - 35/40mm | pcs | 1 |

# LOT 4. Compilation of educational guide titled "Establishing and organization of production of organic origin fertilizers"

Description

Create a comprehensive educational guide titled "Establishing and organization of production of organic origin fertilizers" to guide farmers, agribusinesses, students, and organizations in organizing and managing various organic fertilizer production systems.

Scope of Work

* Study and presentation of the methods used to produce organic origin fertilizers at the teaching-experimental educational farm of Balahovit.
* Develop clear learning content up to 30 pages, including practical examples and diagrams for building production units.
* Also, include cost-benefit analysis of the methods used in the teaching-experimental farm of Balahovit in the guide.
* The guide should contain international best practices as examples, with web links provided.
* The guide needs to be approved by the ANAU expert team.

**Sample form for provision of price offers for service delivery**

**Sample Form (APPENDIX 1)**

[Your organization's name, registration number, address, name and surname of the head], with this price offer, presents its interest in providing the following services to the Armenian National Agrarian University:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| N | Name of material/operation | Unit of measure | Quantity required | Cost |
| **LOT 1: Organization of a demonstration unit using microorganisms to obtain dry and liquid fertilizers** | | | | |
| 1 | Tractor service/initial hauling and mixing | hour | 50 |  |
| 2 | Provision of water supply from a source 50m away | meter | 50 |  |
| 3 | Laboratory sampling | Package | 6 |  |
| 4 | Microorganisms | package | 1 |  |
| 5 | 500 l polymer container | pcs | 3 |  |
| 6 | 100 l polymer container | pcs | 3 |  |
| 7 | Electric mixer with a capacity of 2 kW | pcs | 1 |  |
| 8 | Press | pcs | 1 |  |
| **LOT 2. Setting up a demonstration unit using vermicomposting (Californian red worms) technology to produce dry compost** | | | | |
| 1 | 1.5m x 4.0m x 0.8m basin/container, divided into two parts: 1.5m x 2.0m x 0.8m | Item | 1 |  |
| 2 | Rake | Item | 5 |  |
| 3 | Shovel | Item | 5 |  |
| 4 | California worms | Item | 10,000 |  |
| **LOT 3. Setting up a demonstration unit with simple composting technology to produce dry compost** | | | | |
| 1 | Wooden box | Item | 3 |  |
| 2 | Electric sawmill  GHE 135 L / 140 L  Power: 2300 W / 40 rpm  Maximum branch thickness: 0-35/40mm | pcs | 1 |  |
| **LOT 4. Compilation of educational guide titled "Establishing and organization of production of organic origin fertilizers"** | | | | |
| 1 | educational guide | page | 30 |  |
| Total | | | |  |

The price offer for the provision of the specified services is presented in the table below in AMD, which includes the taxes defined by RA legislation.

Attached to the price offer, we present the organization's experience in this field.

We hereby inform you that we understand that the Armenian National Agrarian University is under no obligation to accept our offer, and in case of acceptance, the mentioned services may be changed depending on the progress in the project.

Name and surname of the head of the organization:

Date:

Signature:

Seal:

1. The Latim names of the strains pf microorganisms [↑](#footnote-ref-1)