# Report on basic seed multiplication for gramineae and legume for dissemination to NARS in Colombia

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CIAT
International Center for Tropical Agriculture

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RESEARCH PROGRAM ON
Livestock

Improved feed & forage germplasm and new tools and technologies for breeding

# Report on basic seed multiplication for gramineae and legume for dissemination to NARS in Colombia

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**Rationale**

The AGROSAVIA-CIAT forage network, established in 2018, seeks to expand the range of forage options to increase the efficiency, competitiveness, and resilience of the livestock production sector in Colombia. As such, the forage network aims to evaluate, select and deliver novel forage materials for their use in livestock systems of each of the different regions of the country. Under the FORAGE NETWORK, a commitment was made to multiply and distribute seed (botanical and/or vegetative) at CIAT to establish new experiments in five research centers of the Colombian Agricultural Research Corporation (AGROSAVIA) according to their interest and needs.

The multiplication field was located in the facilities of the International Center for Tropical Agriculture (CIAT) located at 3o 50' 80''N, -76o 34'76''W. This region of the country, according to the Holdridge life zone classification system, is classified as tropical dry forest and has an average rainfall for the period 2019-2020 of 756 mm/year. CIAT is located at 965 m.a.s.l. and has an average temperature of 24oC.

The CIAT soils and in particular the site where the seed production and multiplication banks were established are classified as Cumulic Haplustolls. These are Mollisols soils with relatively high organic matter content (3 - 4%), clay texture (>40% clay <40% silt), pH < 7.5 and phosphorus content (Bray II) > 40 ppm.

The materials defined for multiplication and distribution were: *Cenchrus ciliaris, Chloris gayana, Megathyrsus maximus, Brachiaria sp, Arachis pintoi, Clitoria ternatea, Centrosema molle and Centrosema macrocarpum.* These materials were defined based on previous work carried out by CIAT and Corpoica (now Agrosavia) in which they showed potential to be considered a viable alternative for animal feed, improving diet quality and production parameters.

To obtain the basic seed of the grasses *Chloris gayana, Cenchrus ciliaris* and *Megathyrsus maximus*, vegetative material was collected in the Patía Valley, Cauca, in southwestern Colombia. Germplasm of 20 accessions of *Chloris gayana*, 15 of *Cenchrus ciliaris*, and 130 of *Megathyrsus maximus* were obtained. These materials were taken to CIAT in Palmira, Valle del Cauca and were planted in Jiffys and placed in pots to be conserved in greenhouses in order to provide adequate conditions to guarantee their survival. After three weeks, they were taken to the field to be planted in linear furrows, and 4 months after planting in the field, botanical and vegetative seeds were obtained.

The activities that were developed during this period were:

- Obtaining plant material for establishment in seed multiplication fields.
- Maintenance of seed multiplication fields
- Obtaining cuttings of *M. maximus.*
- Sowing in Jiffys of the obtained cuttings.

- Collection of botanical seed of *Chloris gayana* and *Cenchrus ciliaris*.
- Processing of botanical seeds of *Chloris gayana* and *Cenchrus ciliaris*
- Sowing in Jiffys of botanical seed of *Chloris gayana* and *Cenchrus ciliaris*
- Germplasm maintenance in greenhouses
- Sowing of *Chloris gayana* and *Cenchrus ciliaris* in propagation fields
- Botanical seed collection and sowing in *Chloris gayana* and *Cenchrus ciliaris* jiffy plants.
- Maintenance and cleaning of *M. maximus*, *Cenchrus ciliaris* and *Chloris gayana* seed multiplication fields.
- Conditioning of lots for sowing new germplasm.

Once the seed was obtained, the materials were sown in Jiffys and when they germinated and emerged, the germplasm was distributed according to the demand of each research center. For their part, the materials that would be distributed in botanical seed, once the harvesting and seed processing process was completed and when the amount of germplasm for each material requested was reached, they were packaged for shipment to the respective centers. The quantities of seedlings and botanical seed that were dispatched are listed below:

**Table 1.** List of materials delivered AGROSAVIA-CIAT C.I La Libertad Agreement

| *Cenchrus ciliaris* | | *Chloris gayana* | |
|---|---|---|---|
| ILRI Accession | # Plants | ILRI Accession | # Plants |
| 16660 | 96 | 15170 | 91 |
| 12825 | 99 | 15573 | 90 |
| 2020 | 115 | 13053 | 77 |
| 12464 | 97 | 13097 | 83 |
| 18483 | 94 | 10103 | 93 |
| 6652 | 95 | 645 | 96 |
| 777 | 100 | 13329 | 117 |
| 16617 | 89 | 7757 | 82 |
| 15687 | 111 | 6333 | 96 |
| 6642 | 105 | 1053 | 77 |
| 6645 | 92 | 7384 | 69 |
| 6647 | 99 | | |

**Table 2.** List of materials delivered Agreement AGROSAVIA-CIAT C.I Motilonia

| *Megathyrsus maximus* | | | |
|---|---|---|---|
| CIAT Accession | # Plants | CIAT Accession | # Plants |
| 6954 | 70 | 26906 | 28 |
| 6955 | 70 | 26721 | 35 |
| 6960 | 70 | 6996 | 35 |
| 6968 | 70 | 16046 | 98 |
| 6981 | 70 | 26944 | 19 |
| 6983 | 70 | 26924 | 14 |
| 6984 | 70 | 26911 | 15 |
| 16003 | 70 | 26917 | 20 |
| 16004 | 70 | 16057 | 31 |
| 16005 | 70 | 16034 | 92 |
| 16011 | 70 | 16059 | 92 |
| 16017 | 70 | 6929 | 32 |
| 16018 | 70 | 6949 | 30 |
| 16019 | 70 | 6868 | 17 |
| 16021 | 70 | 6849 | 17 |
| 16023 | 70 | 6872 | 19 |
| 16025 | 70 | 6991 | 21 |
| 16027 | 70 | 6951 | 18 |
| 16028 | 70 | 6948 | 34 |
| 16031 | 70 | 6862 | 18 |
| 16060 | 70 | 6843 | 38 |
| 691 | 70 | 6826 | 29 |
| 692 | 70 | 6839 | 35 |
| 6095 | 70 | 6497 | 17 |
| 6171 | 70 | 6112 | 18 |
| 6175 | 70 | 6091 | 35 |
| 6500 | 70 | 6893 | 17 |
| 6525 | 70 | 6879 | 22 |
| 6783 | 70 | 6912 | 18 |
| 6784 | 70 | 6798 | 17 |
| 6796 | 70 | 6489 | 28 |
| 6805 | 70 | 6536 | 14 |
| 6836 | 70 | 669 | 33 |
| 6840 | 70 | 622 | 31 |

Continue below

| *Megathyrsus maximus* | | | |
|---|---|---|---|
| CIAT Accession | # Plants | CIAT Accession | # Plants |
| 6842 | 70 | | |
| 6855 | 70 | 6928 | 1 |
| 6864 | 70 | 16071 | 1 |
| 6866 | 70 | 26923 | 1 |
| 6890 | 70 | 16054 | 1 |
| 6897 | 70 | 6962 | 1 |
| 6906 | 70 | 16062 | 1 |
| 6918 | 70 | 6799 | 1 |
| 6923 | 70 | 16038 | 1 |
| 6945 | 70 | 6969 | 1 |
| 26925 | 94 | 26900 | 1 |
| 16035 | 100 | 6299 | 1 |
| 26947 | 28 | 6963 | 1 |
| 26951 | 33 | 16049 | 1 |
| 26933 | 34 | 16055 | 1 |
| 36000 | 34 | | |

**Table 3**. List of materials delivered AGROSAVIA-CIAT C.I Nataima Agreement

| *Cenchrus ciliaris* | | *Chloris gayana* | |
|---|---|---|---|
| ILRI Accession | # Plants | ILRI Accession | # Plants |
| 16660 | 96 | 15170 | 91 |
| 12825 | 99 | 15573 | 90 |
| 2020 | 115 | 13053 | 77 |
| 12464 | 97 | 13097 | 83 |
| 18483 | 94 | 10103 | 93 |
| 6652 | 95 | 645 | 96 |
| 777 | 100 | 13329 | 117 |
| 16617 | 89 | 7757 | 82 |
| 15687 | 111 | 6333 | 96 |
| 6642 | 105 | 1053 | 77 |
| 6645 | 92 | 7384 | 69 |
| 6647 | 99 | | |

| *Megathyrsus maximus* | | | |
|---|---|---|---|
| CIAT Accession | # Plants | CIAT Accession | # Plants |
| 26925 | 94 | 16019 | 100 |
| 16035 | 100 | 16018 | 100 |
| 6984 | 100 | 16017 | 100 |
| 36000 | 30 | 16011 | 100 |
| 26933 | 34 | 691 | 100 |
| 26947 | 29 | 692 | 100 |
| 26951 | 30 | 6095 | 100 |
| 26944 | 21 | 6171 | 100 |
| 26924 | 14 | 6175 | 100 |
| 26911 | 16 | 6500 | 100 |
| 26917 | 19 | 6525 | 100 |
| 16057 | 32 | 6783 | 100 |
| 16034 | 93 | 6784 | 100 |
| 16059 | 93 | 6796 | 100 |
| 26906 | 30 | 6805 | 100 |
| 26721 | 34 | 6836 | 100 |
| 16046 | 97 | 6840 | 100 |
| 6996 | 35 | 6842 | 100 |
| 6948 | 33 | 6855 | 100 |
| 6951 | 19 | 6864 | 100 |
| 6991 | 21 | 6866 | 100 |
| 6949 | 33 | 6890 | 100 |
| 6929 | 31 | 6897 | 100 |
| 6843 | 38 | 6906 | 100 |
| 6862 | 19 | 6918 | 100 |
| 6912 | 18 | 6923 | 100 |
| 6879 | 25 | 6954 | 100 |
| 6893 | 18 | 6955 | 100 |
| 6872 | 19 | 6960 | 100 |
| 6849 | 18 | 6981 | 100 |
| 6868 | 18 | 6983 | 100 |
| 6826 | 29 | 16003 | 100 |
| 6839 | 35 | 16004 | 100 |
| 6091 | 35 | 16005 | 100 |
| 6112 | 14 | | |
| 6497 | 15 | Macollas | |
| 6798 | 18 | 16071 | 1 |
| 6489 | 35 | 26923 | 1 |
| 6536 | 14 | 16054 | 1 |

Continue below

| *Megathyrsus maximus* | | | |
|---|---|---|---|
| CIAT Accession | # Plants | CIAT Accession | # Plants |
| 669 | 33 | 6962 | 1 |
| 622 | 28 | 16062 | 1 |
| 6968 | 100 | 6799 | 1 |
| 6945 | 100 | 16038 | 1 |
| 16060 | 100 | 6969 | 1 |
| 16031 | 100 | 26900 | 1 |
| 16028 | 100 | 6299 | 1 |
| 16027 | 100 | 6963 | 1 |
| 16025 | 100 | 16049 | 1 |
| 16023 | 100 | 16055 | 1 |
| 16021 | 100 | 6828 | 1 |

On the other hand, a request for seed was made to the CIAT Genetic Resources Bank for 5 accessions of *Arachis pintoi*. The seed was sown in a pool with soil (sand-earth). From these materials, cuttings of each accession were obtained and placed in containers with water to be shipped to the El Nus research center in the department of Antioquia. In July 2020, the plant and botanical material of *Arachis pintoi* was prepared and shipped by land. A total of 14 baskets were sent with accessions CIAT 22338, CIAT 18749, CIAT 17434, CIAT 22234, CIAT 22160 and two packages, one with 200 botanical seeds of accession CIAT 22340 and the other with 50 seeds of accession CIAT 22160.

The Motilonia research center requested seed from 25 accessions of *Clitoria ternatea*, 8 accessions of *Centrosema molle* and 7 accessions of *Centrosema macrocarpum*. The seeds were collected in three harvests, the seeds were processed and selected and finally 300 botanical seeds per accession were packaged for shipment to the Research Center.

On the other hand, 5 accessions of *Cratylia argentea* have been sown in CIAT Palmira with the purpose of collecting seed of this material to make a new distribution to the centers that demand this material.

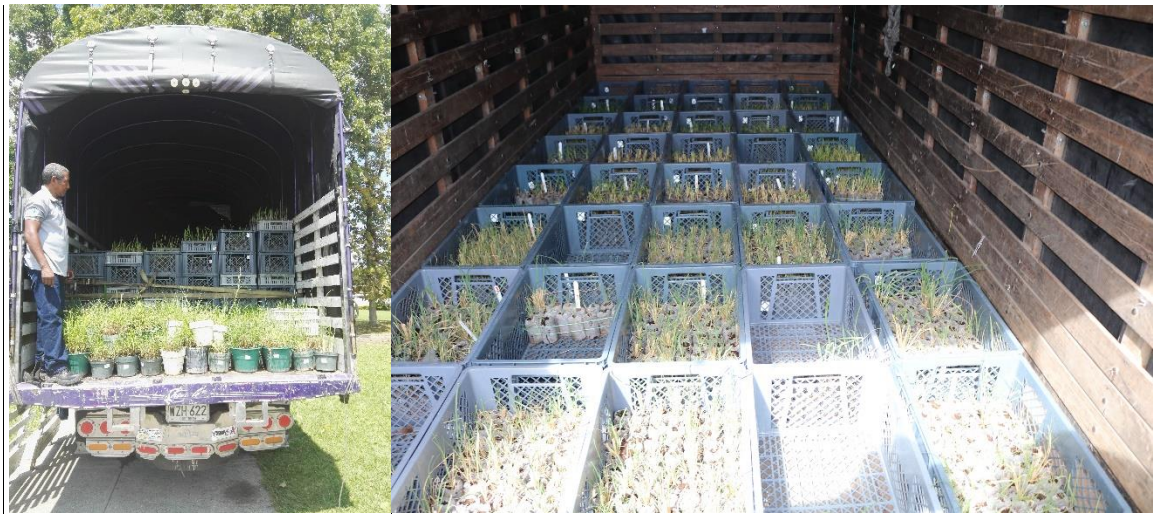
Germplasm multiplication field, *M. maximus*

*Centrosema sp*. multiplication field

*Arachis pintoi* multiplication field

Botanical seed sowing in Jiffys

Transplanting of *Chloris gayana* in pots



**Dispatch of seed to AGROSAVIA Research Centers**

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Bioversity International and the International Center for Tropical Agriculture (CIAT) are part of CGIAR, a global research partnership for a food-secure future.

Bioversity International is the operating name of the International Plant Genetic Resources Institute (IPGRI).

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