





# International Nurseries:

Data generation, curation, sharing and utilization

BigData meeting

**Rabat 9-14 December 2018**

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# International Nurseries…

1. Background
   - Mandate, vision and mission

2. Operations of International Nurseries
   - Germplasm development and IN assembling
   - Seed multiplication, processing
   - Seed quarantine monitoring and clearance
   - Seed packaging
   - IN seed distribution to cooperators
   - Data recovery, analysis and sharing

1. Challenges and Way Forward

# International Nurseries…

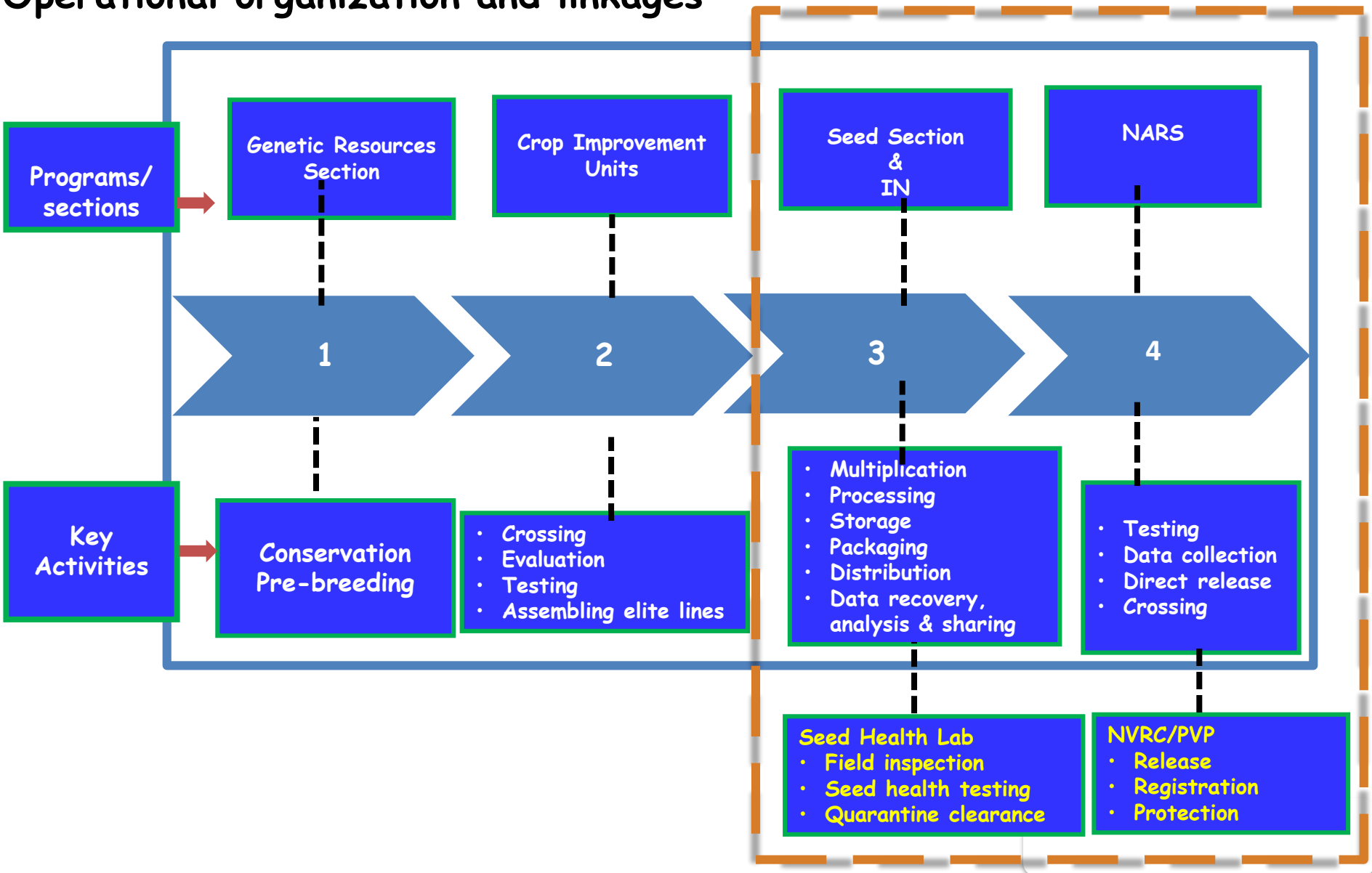
## 1. Background

- **ICARDA's mandate**
  - Develop climate and farming system change resilient improved germplasm with high yield and quality and resistant or tolerant to (a)biotic stresses
    - Cereals: bread & durum wheat, food & malt barley
    - Legumes: Faba bean, chickpea, lentil & grass pea

- **International Nurseries (IN)**
  - Vision
    - Make germplasm under development for ICARDA mandate crops available to global community of collaborators
  - Mission
    - Ensure safe movement and transfer of germplasm among countries free of quarantine pests

# International Nurseries…

## Operational organization and linkages



# International Nurseries…

## Key IN operations:

- Developing elite germplasm to assemble IN trialing system (breeders)
- Seed production of elite germplasm for IN trialing system (Seed Section)
- Processing, preparation, packaging and storage of IN (Seed Section)
- Announcement, allocation and distribution of IN requests (Seed Section with breeders)
- Data recovery, analysis and sharing with community of breeders (Seed Section)
- Ensuring seed health and issuing phytosanitary certificates for IN recipient countries (Seed Health Laboratory)

# International Nurseries…

## Location

**Within ICARDA's decentralization strategy, IN is handled from its headquarters in Lebanon**

**IN operation is based at AREC with the following facilities:**

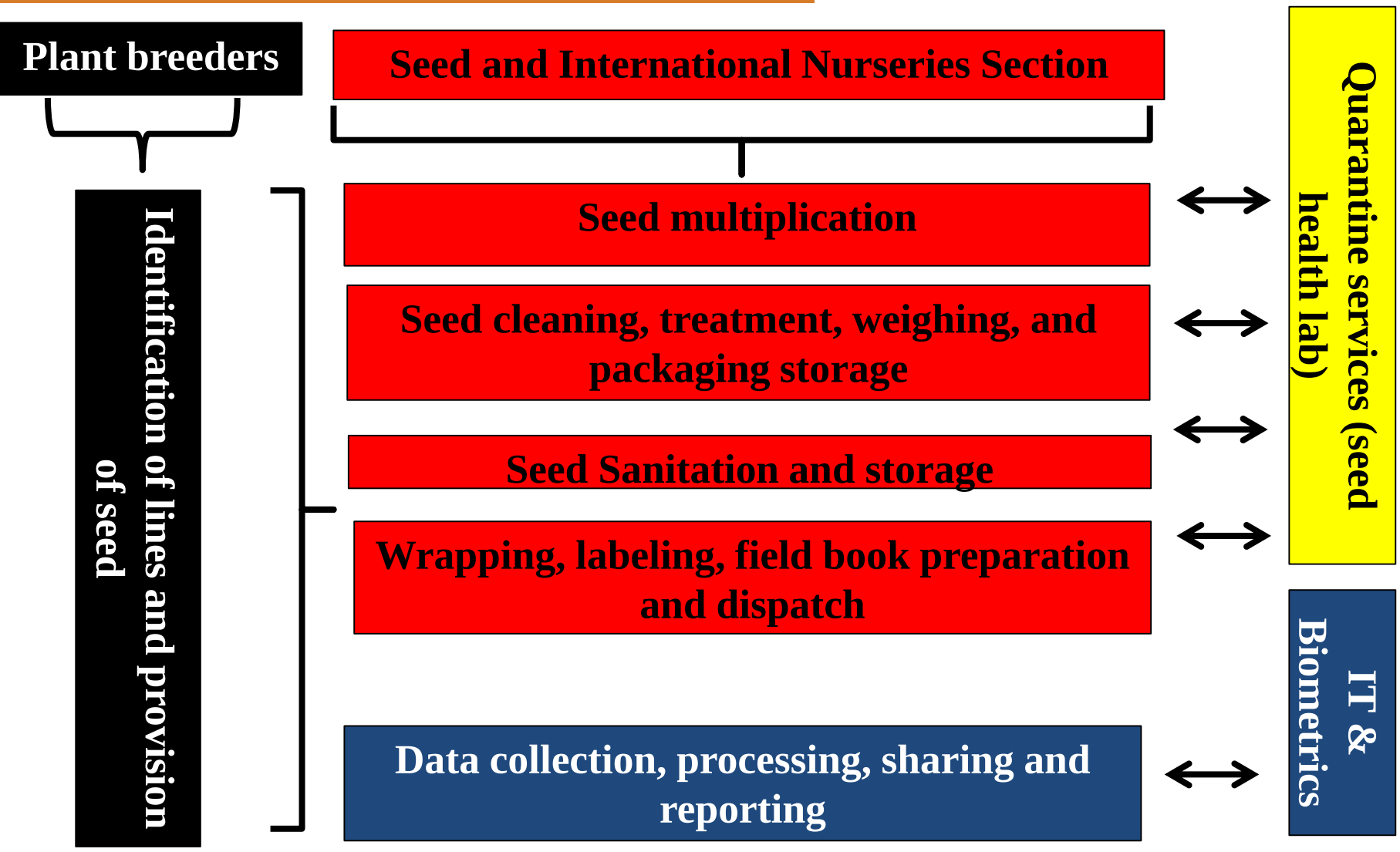
- Fields for seed multiplication: 20 ha (including rotation)
- Farm machinery: Primary and secondary tillage (AREC) and plot planters and harvesters (ICARDA)

- Seed cleaning and treatment machines: Mini-scale seed cleaning and treatment equipment
- Post-harvest facilities: Seed preparation and storage facilities (renovated)

- Mini-seed laboratory: seed quality testing for IN
- IT and Biometrics support

Seed Health Laboratory based in Terbol for quarantine

# Consolidated processes and major contributors into International Nurseries

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# International Nurseries processes visualized…

## Operation of International Nurseries

Seed production

Temporary seed storage & fumigation

Quarantine clearance

Geoinformatics based database

NARS

Seed storage

Seed distribution

Bypass option

Seed cleaning

Seed washing

Seed treatment

Automated counting, packaging & labeling

# International Nurseries.

## Seed production

- Seed Section operates close to 20 ha of land from AREC (AUB) in Beka'a Valley, Lebanon

- AREC provide land and farm machinery for field operations and infrastructure for irrigation

- Seed Health Laboratory provides field inspection

# International Nurseries…

## Summary of seed production in 2017-18 season

| Crop | | Nursery | # entry | Plot/m² | (ha) | Tons | (T/Ha | Range |
|---|---|---|---|---|---|---|---|---|
| Cereals | Barley | Elite lines | 130 | 24 | 0.3 | 2.5 | 8.1 | 2.8 - 10.8 |
| | | Observation | 211 | 11.2 | 0.2 | 2 | 8.6 | 4.8 - 12.1 |
| | Bread wheat | Elite lines | 389 | 20.5 | 0.8 | 5.8 | 7.3 | 1.8 - 10.1 |
| | | Observation | 619 | 3.4 | 0.2 | 1.7 | 8 | 3.2 - 11.7 |
| | Durum wheat | Elite lines | 145 | 43 | 0.6 | 3.7 | 5.9 | 2.5 - 8.6 |
| | | Observation | 510 | 7 | 0.4 | 2.3 | 6.3 | 2.7 - 10.6 |
| | **Subtotal cereals** | | **2004** | **109.12** | **2.4** | **18** | | |
| Legumes | Chickpea | Elite lines | 400 | 18 | 0.7 | 2.5 | 3.5 | 1.8 - 5.9 |
| | Lentil | Elite lines | 212 | 21.6 | 0.5 | 0.6 | 1.2 | 0.1 - 2.4 |
| | | Observation | 90 | 18 | 0.2 | 0.2 | 1.2 | 0.1 - 2.5 |
| | Faba bean | Elite lines | 271 | 18.2 | 0.5 | 1.3 | 2.5 | 0.5 - 3.8 |
| | Grass Pea | Elite lines | 100 | 21.6 | 0.2 | 0.5 | 2.2 | 1.6 - 3.0 |
| | **Subtotal legumes** | | **1073** | **97.4** | **2.1** | **5.1** | | |
| **Total** | | | **3077** | **206.5** | **4.6** | **23.1** | | |

# Variety maintenance and early generation seed production from ICARDA originated varieties released by NARS

| Crop | Class | # entries | areas (ha) | Production (kg) | Ton/Ha |
|---|---|---|---|---|---|
| Barley | Pre-basic | 5 | 0.05 | 360 | 8.0 |
| | Breeder | 6 | 0.01 | 25 | 3 |
| Bread | Pre-basic | 3 | 0.05 | 390 | 6.3 |
| Durum | Pre-basic | 9 | 0.07 | 440 | 5.8 |
| | Breeder | 7 | 0.01 | 25 | 3 |
| Chickpea | Basic | 9 | 0.3 | 710 | 2.3 |
| Lentil | Basic | 6 | 0.2 | 210 | 1.0 |
| Faba bean | Basic | 15 | 0.2 | 380 | 2.0 |
| | | 60 | 0.89 | 2540 | |

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# International Nurseries…

## Seed distribution

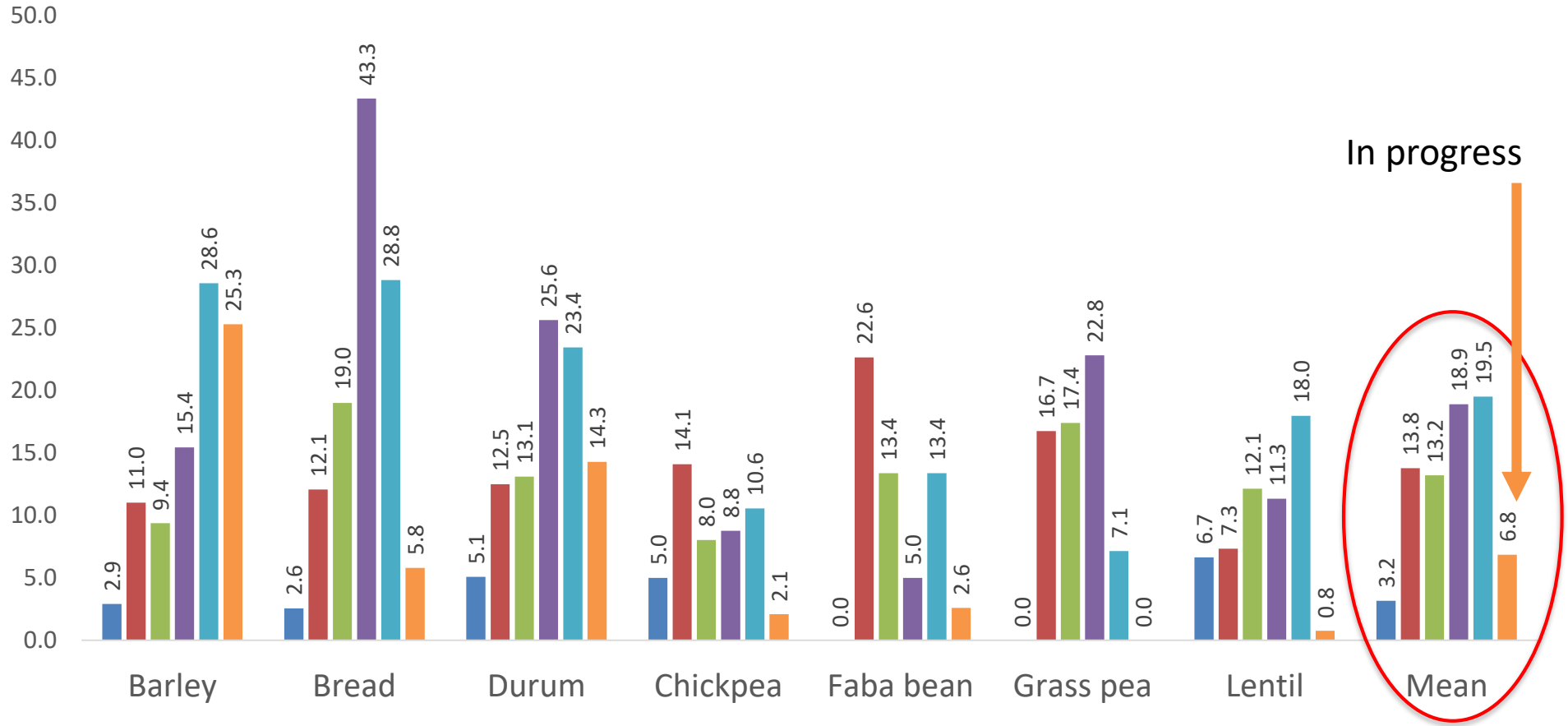
### Number of sets and lines for international nurseries in 2017/18

| Crop | Nurseries | Genotypes | Sets | Countries | Cooperators |
|---|---|---|---|---|---|
| Chickpea | 11 | 393 | 363 | 25 | 47 |
| Lentil | 12 | 487 | 318 | 22 | 38 |
| Faba Bean | 11 | 298 | 153 | 19 | 27 |
| Grass Pea | 4 | 107 | 51 | 14 | 19 |
| S. Barley | 4 | 316 | 200 | 25 | 39 |
| W. Barley | 2 | 71 | 52 | 11 | 20 |
| Durum Wheat | 3 | 882 | 159 | 34 | 65 |
| S. Bread Wheat | 5 | 550 | 215 | 24 | 49 |
| Winter Wheat | 1 | 335 | 10 | 5 | 5 |
| **Grand Total** | **53** | **3439** | **1521** | **44** | **135** |

# Seed packaging for dispatch to 50 countries

# Rates of data recovery

Percentage of data recovered from different crops for the period of 2012-13 to 2017-18

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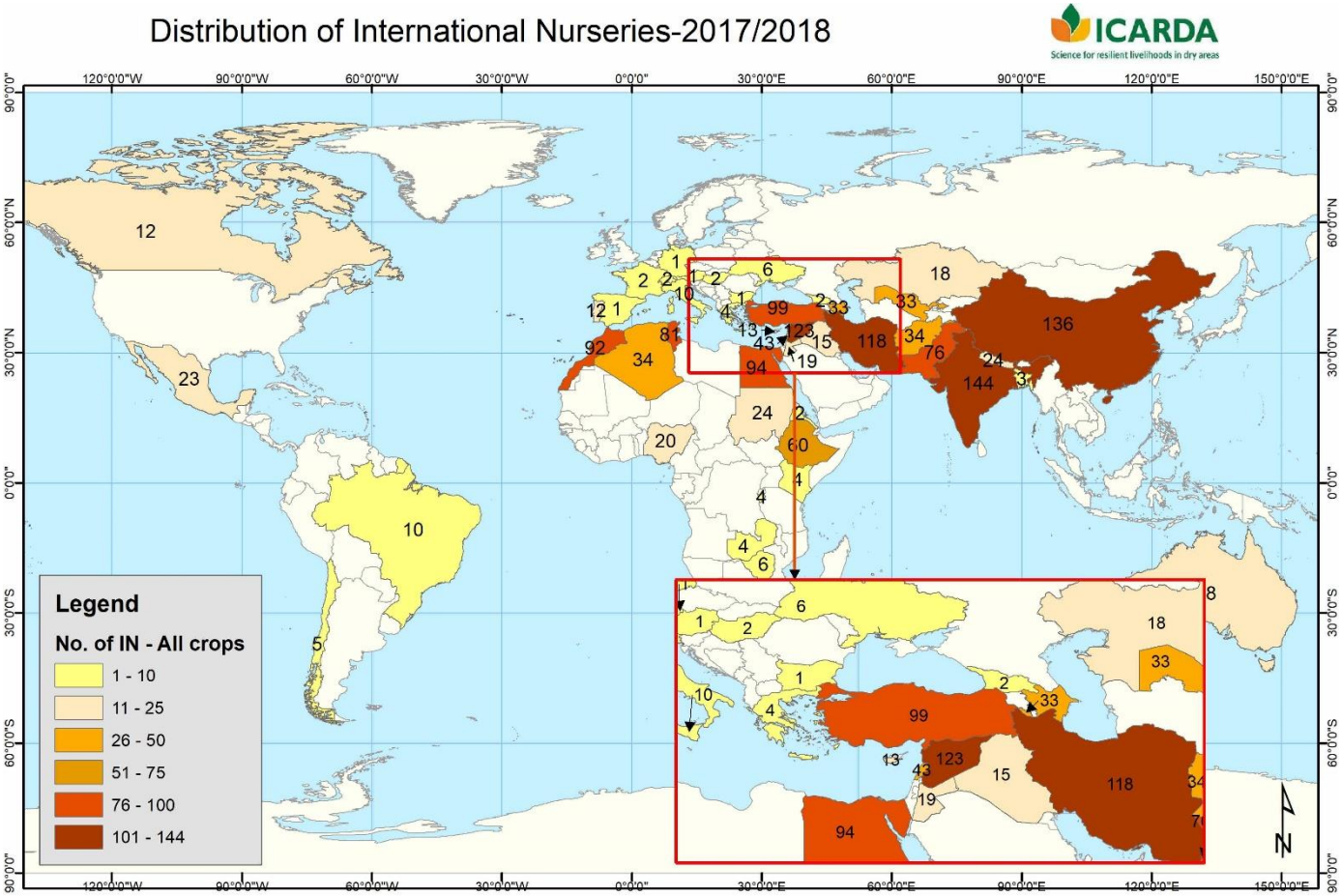
# International Nurseries …

## Distribution of international nurseries 2017/18

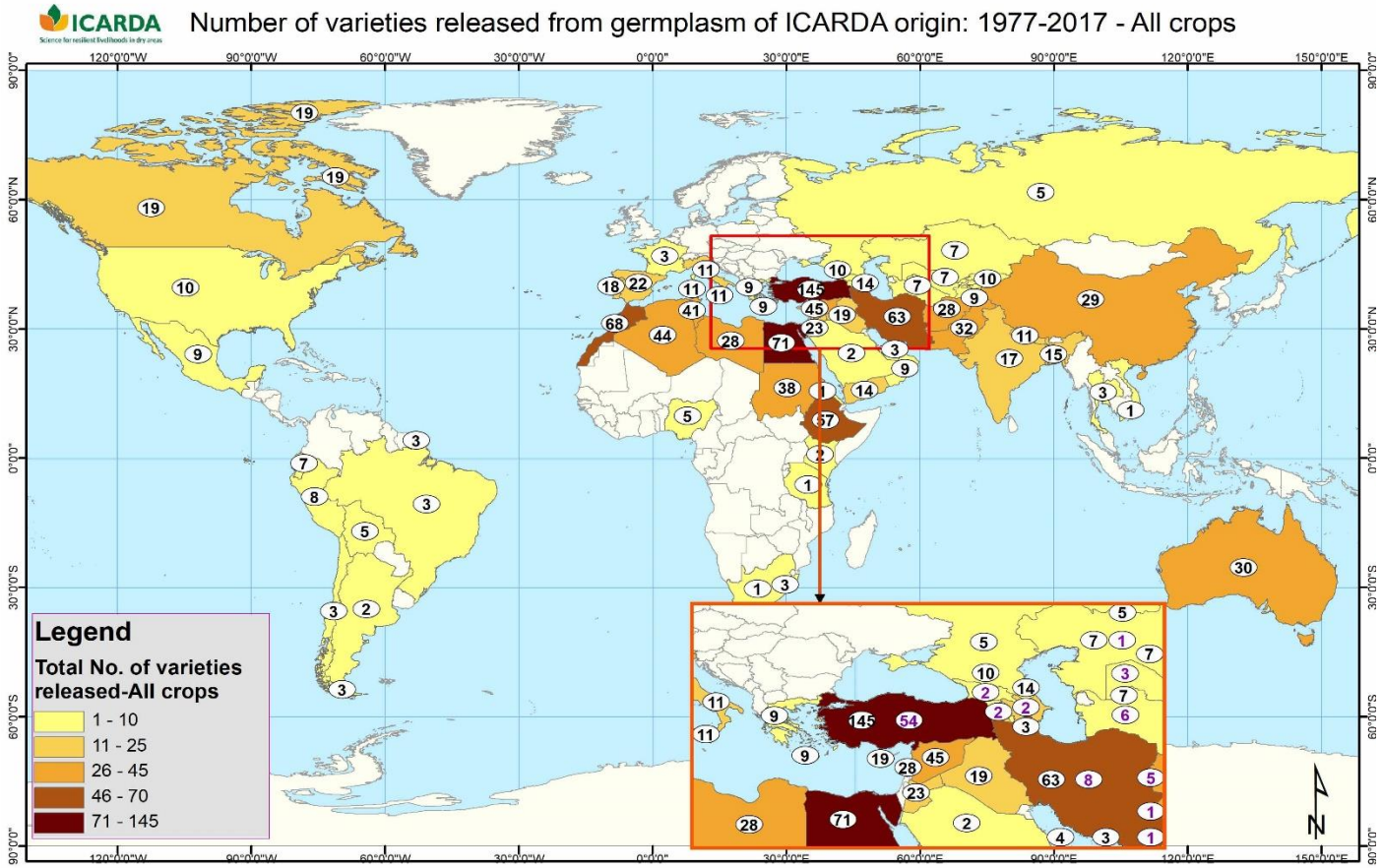



### Uses of germplasm

- Both developing (47) and developed (11) countries
- Both public (106) and private (19) collaborators

# International Nurseries…

## Achievements in Variety Release




### Uses of germplasm

- Direct releases or as parents for crossing
- Both developing and developed countries
- Both public and private breeding programs

# International Nurseries …

**Reporting and data management (recovery, processing and sharing)**

- Database developed for receiving and uploading the performance of nurseries across countries
- Data is shared with breeders and the community of breeders (INDMS) to inform future work
- IN distribution are reported to ITGPRFA as per the requirements
- Variety release database with key traits, pedigree and selection history maintained

# International Nurseries…

## Improvements in IN handling

### Production arrengements

- Staggering IN production to overcome delay

### Introduction of automatic packaging

- Reduced cost and labor by 90%
- Helped overcome delay in IN distribution

### Introducing IN and data management systems

- Developed online ordering reduced work load & error
- Improved IN shipping management

http://indms.icarda.org/

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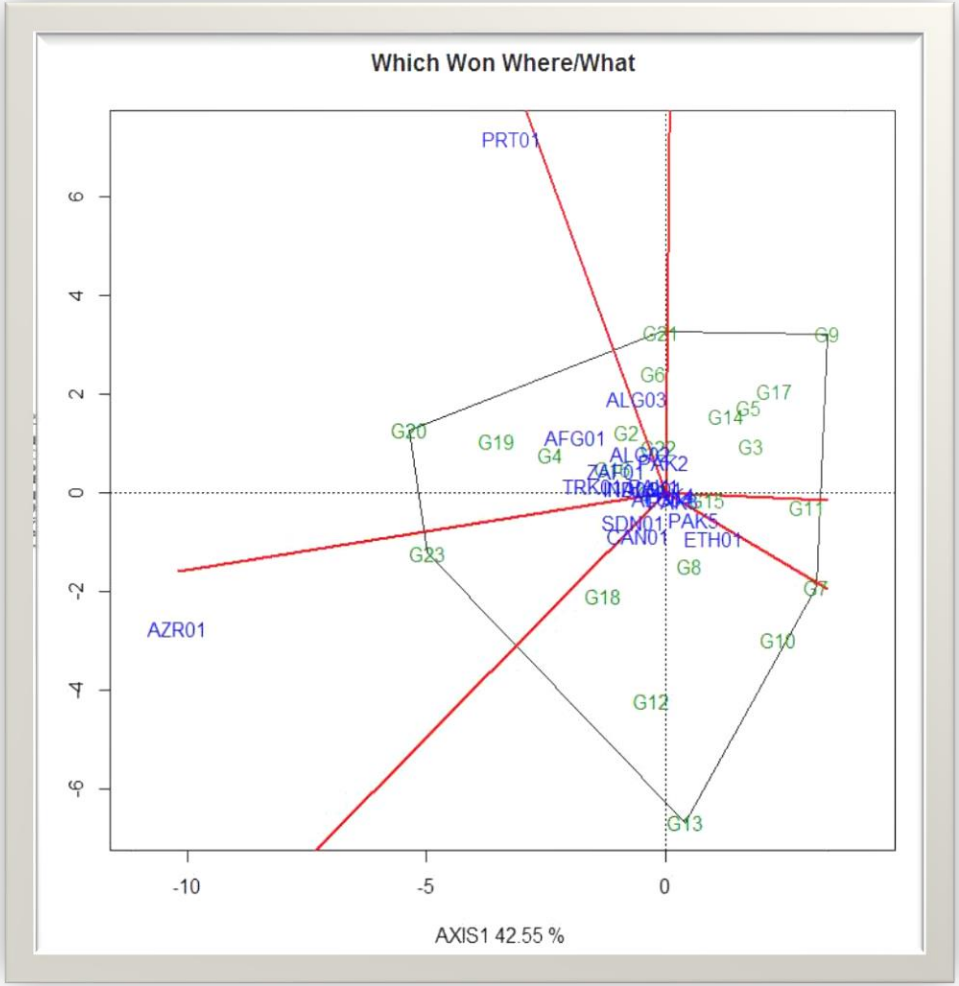


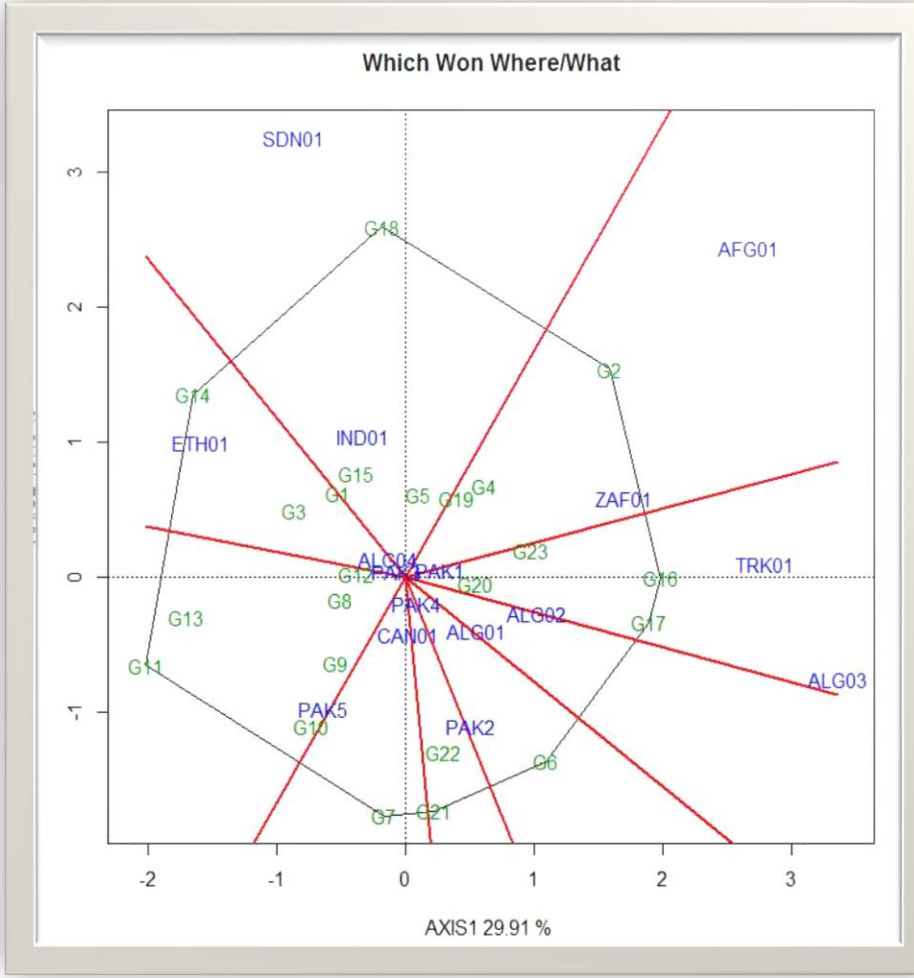


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# International Nurseries…

## Current challenges

- Low data recovery rate at 13% of the total sets distributed
- A professional database and biometrics support particularly on data base maintenance and automation of the tedious International Nurseries preparation, data compilation and sharing processes is urgently required (BMS?)
- Winter barley, Facultative winter wheat and Global Durum Program, durum and bread are to be harvested, processed, tested, prepared and dispatched within one and half month
- Increased water scarcity with expanding GRS and breeding activities at AREC
- Demoralized technical staff due to poor compensation package. U$D 500 is far below the salaries of technicians at LARI

# International Nurseries…

## The Way forward

- Automatic data collection and entry
- Annual IN data analysis workshops to boost data recovery
- Georeferencing for better targeting to reduce test sites and costs and increase efficiency

Thank You