Ecole Nationale d'Agriculture de Meknès
National School of Agriculture of Meknès

- Public Institution of Higher Education in Agriculture
- Created in 1948
- Under the authority of the Ministry of Agriculture

Pr. Hakima BAHRI
ENA-Meknes, Morocco

MISSION

- Provide quality training leading to the degree of “Agronomy State Engineer” (MS equivalent).
- Contribute to research activities in various fields of agriculture and natural resources.
- Contribute to agricultural and rural development through outreach, continuing education, consulting and expertise.

RESSOURCES

Staff

- 58 Faculty
- 163 Administrative, Technical and Support staff

Department	Faculty	US Alumni
Agronomy & Plant Genetics	7	4
Animal Science	6	3
Plant & Environment Protection	9	1
Pomology & Viticulture	4	2
Soil Science	2	1
Agricultural Economics	8	2
Development & Extension	10	0
Basic Sciences	10	0
Total	58	12

RESSOURCES

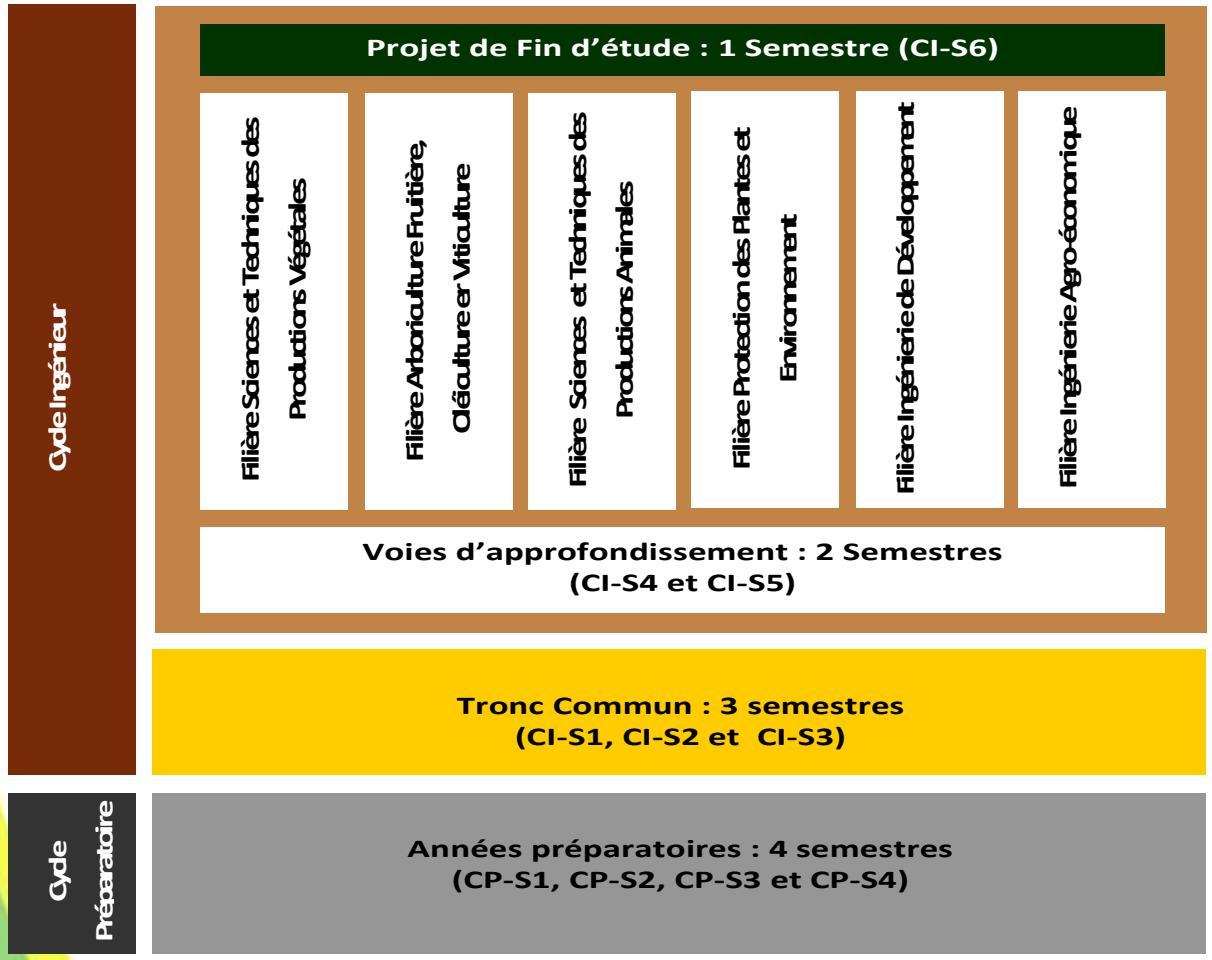
Infrastructure

- 3 Dorm
- Auditoriums / Classerooms
- Labs
- Farm (70 ha)
- Véhicules, buses, …
- Library

STUDENTS ENROLLEMENT

- Studies are supported by the Gov.
- 450-500 students enrolled each year
  - About 50% are girls
  - 10 to 15 % foreign franco-African students
  - Students live on campus dorms

THE CURRICULUM



6 Accredited Fields of Specialty

Applied Agricultural Sciences (common core)

Fundamental Sciences

Practical field trainings: an important piller of the curriculum

Main areas of research

- Crop production
- Alternative crops / MAPs
- Fruit tree, olive & viticulture
- Biotechnologies and tissue culture
- Soil management and conservation
- Soil survey and mapping
- Irrigation management
- Sustainable agriculture
- Organic farming
- Plant protection / Pest management
- Animal production
- Ag economics
- Extension – Development engineering
- Rural Sociology
- Renewable energies
- …

RESEARCH ACTIVITIES

- Collaboration
  - ENA-IAV-ENFI consortium
  - Universities in Morocco
  - Universities and organisms abroad (mainly Europe)

- Research funding
  - Internal funds / Ministry of Agriculture
  - Contractual projects (public & private)
  - International projects

SERVICES

- Agropole Olivier:Olive & olive oil production and quality management
- Ferti-Conseil: Soil testing and fertilizer management advising
- Plant Clinic: pest and disease diagnosis and recommendations
- Center for continuing education, & audio-visual production

OUTREACH / EXTENSION

We provide support to farmers and professionals in various domains of expertise of ENA faculty

COOPERATION / COLLABORATION

- ENA-IAV-ENFI consortium
- Universities in Morocco
- Private (companies, coops, Ag chambers, ets)
- Universities and organisms abroad (mainly Europe, Africain countries)
- US (Millenium Challenge Corporation, USAID, UMN)






Background

1987: Engineer (MS equivalent) in Plant Breeding. Institut Agronomique et Vétérinaire Hassan II, Rabat, Morocco

1992: PhD in Plant Breeding, University of Minnesota, USA

1991-date: Faculty member at ENA-Meknes, Morocco
Department of Agronomy and Plant Genetics

Academic tasks

Teaching

- Introductory Plant Breeding (undergraduate level)
- Advanced Plant Breeding (Graduate level for Major)
- Introduction to Fundamental Genetics (undergraduate course)

Advising students

- Advising MS theses for Crop Production Major students : 30+ theses advised to date
- Advising seminars for graduate students Crop Production major
- Advising field trainings for graduate and undergraduate students

Contribution to research and development

- Carrying out research and development projects
- Continuing education programs for technicians, engineers & professionals

Administrative responsibilities

- Department head of the Agronomy and Plant Genetics: 1997-2000 & 2004-2009
- Coordinator of the graduate major STPV: 2008- to date
- Coordinated the accreditation process for STPV major : 2009 session & 2014 session

Research: current focus

- Adaptation of cereal genotypes to different agro ecosystems, particularly mountainous and semiarid
- Characterization and evaluation of genetic resources of selected crops: integration of conventional methods and molecular technologies.
- Medicinal and aromatic plants: identification of promising types for domestication and/or valorization in view of a sustainable management of the resources and improvement of the income of the rural population.

Evaluation of advanced cereal breeding lines
Collaborative work : ENA-ICARDA/CGIAR (2014-2017)

New advanced breeding lines from ICARDA breeding programs:

- **20 Durum wheat**
- **12 bread wheat**
- **8 barley lines**

Evaluation: performance and adaptation to local environment

- **Yield and yield components**
- **Phenology**
- **Response to main diseases and pests**

Selection based on agronomic performance

Participatory selection with farmers : based on farmers criteria

Adaptation of Moroccan rapeseed varieties to water logging stress (In collaboration with Dr. Nabloussi – INRA 2013-2014)

Four Moroccan rapeseed varieties evaluated: Narjisse', 'INRA-CZH2', 'INRA-CZH3', & 'INRA- Syn3'

5 Treatments:

- **T0 : Check**
- **T1-T4 : waterlogging stress conditions applied at four different developmental stages**

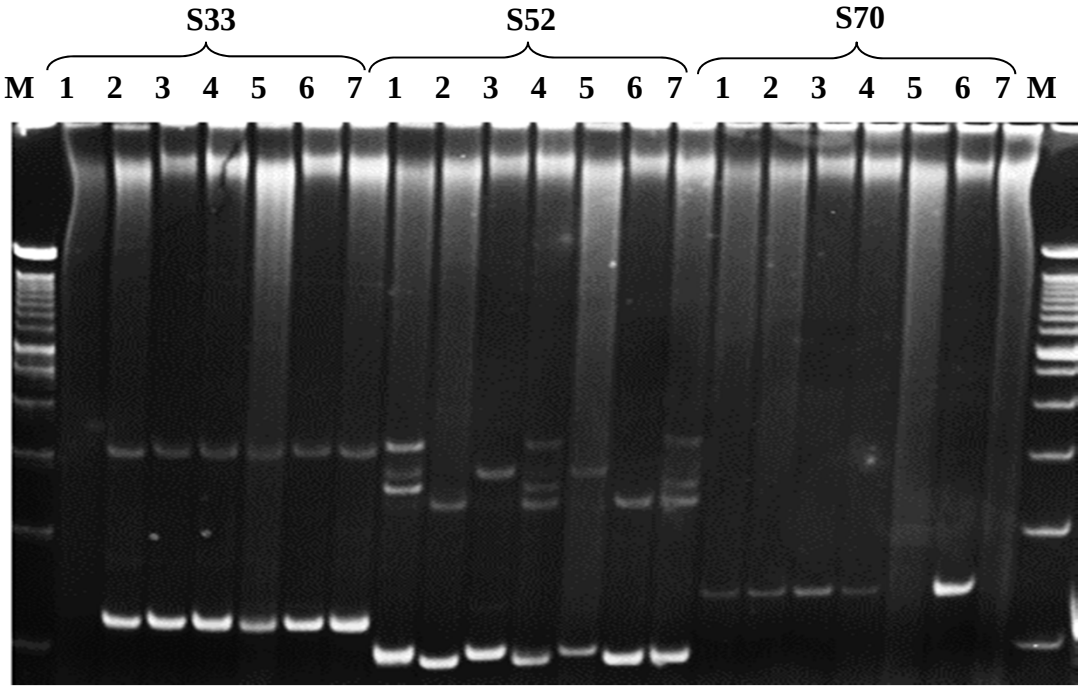
Parameters evaluated :

- **Morphologic**
- **Physiologic**
- **Phenologic**
- **Agronomic**

Study of the genetic diversity of moroccan lentil varielties

In collaboration with Dr. Udupa – ICARDA/CGIAR/INRA (2013-2014)

- Seven moroccan lentil varieties
- 60 microsetellite primers



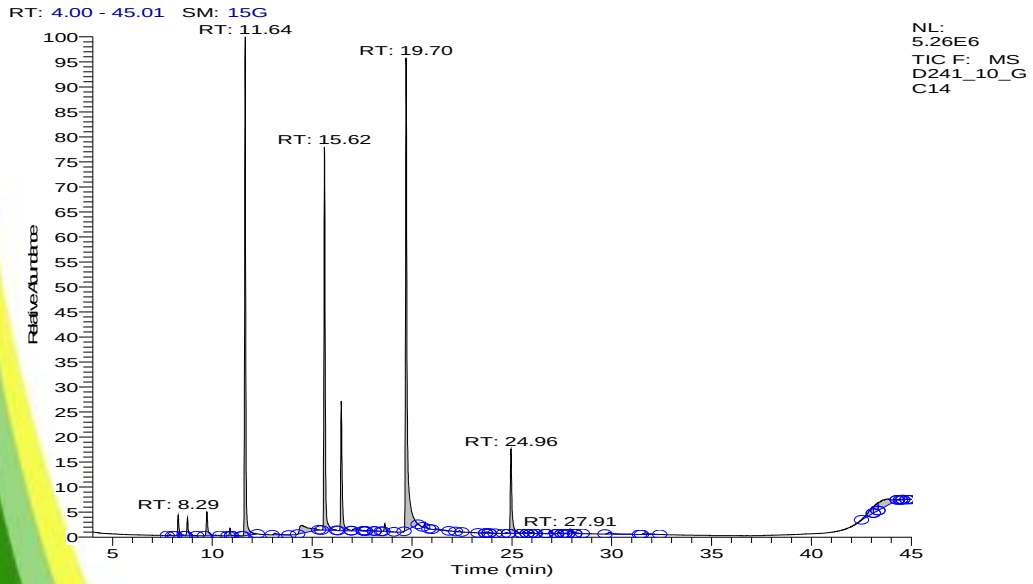
Lavender in Mid-Atlas mountains : Work involving a cooperative of producers in Oulmes

- Survey of spontaneous MAPs
- Survey of cultivated lavander
- Chemical characterization of essential oils
- Support to local cooperative : valorisation of products (dried flowers and essential oils)

- Improve production practices (planting density, fertilization)
- Improve extraction practices (quality of essential oils)

Assistance to lavander cooperative: new distillation unit for essential oils
Training: valorization of products /prospect new markets / local fairs

Chemical profiling of cultivated lavander



Composés majoritaires	Poids moléculaire (g)	lavandin cultivé de Oulmès (%)
Linalol	154.2493	28,84
1,8- Cinéol	154.2493	22,57
Camphre	152.2334	18,33
Borneol	154.2493	7,34
Beta-caryophyllene	204.3511	5,25
Acétate de linalyle	196.2860	2,74
Béta-Terpinene	136.2340	1,52
Alpha-Pinene	136.2340	1,16

Labellisation: IGP (lavander essential oils of Oulmes)

Anacyclus Pyrethrum (Mount Atlas Daisy) : Endemic to Morocco - endangered species (extensive collections on the wild)

Research goals:

- Potential for regeneration
- Domestication : alternative species/crop
- Chemical profiling – screening for prized active compounds

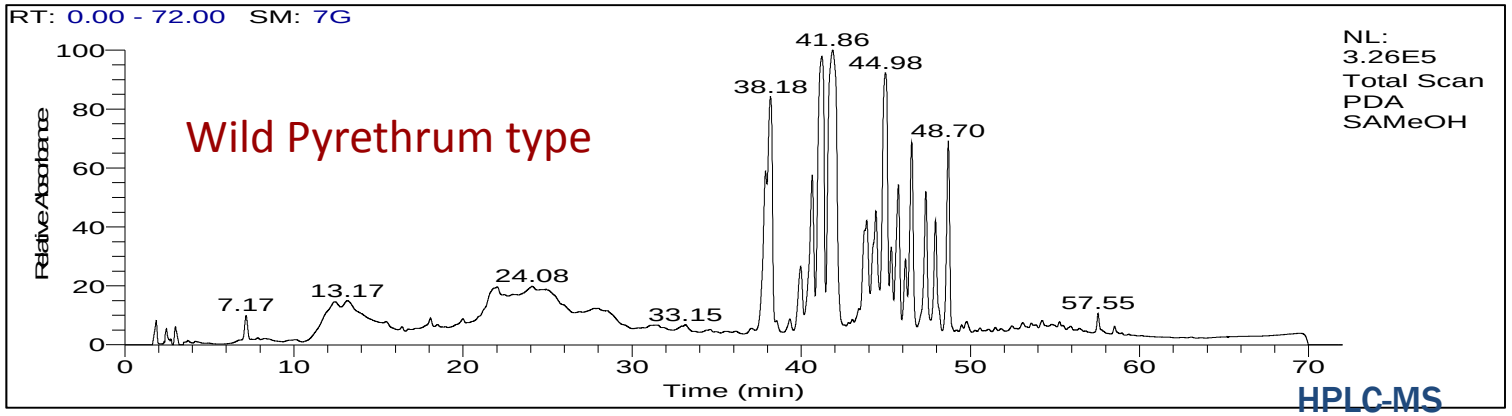
1. Study of the potential of regeneration and domestication

Evaluation of regeneration conditions and seed production

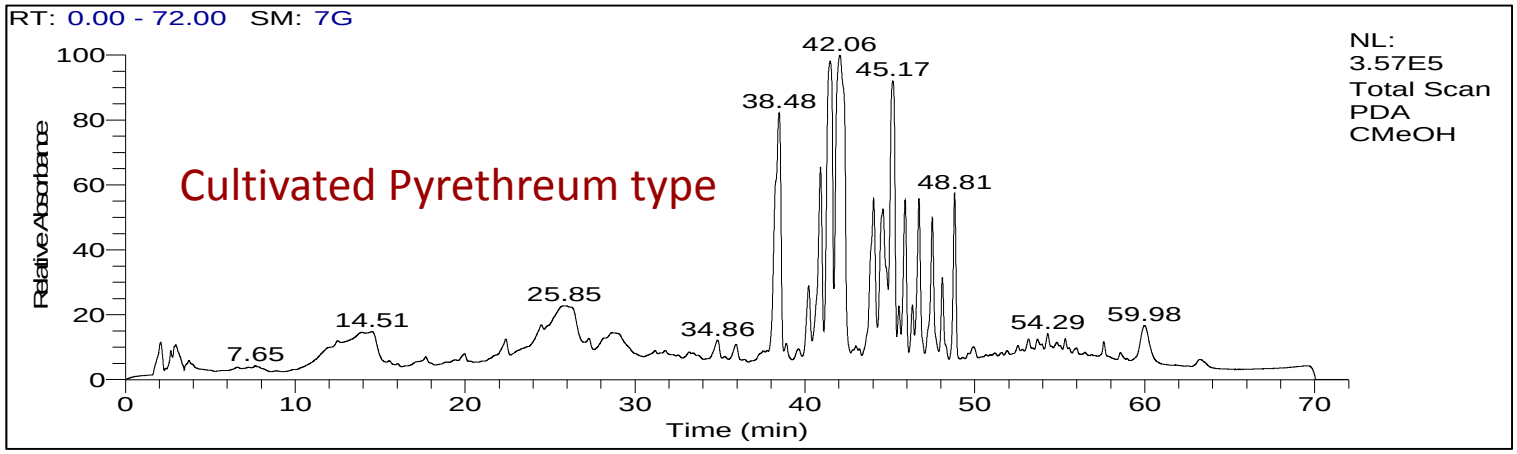
Adaptation to cultivation under field conditions

Agronomic evaluation : management of seed & root production

2. Chemical profiling (wild vs cultivated)



HPLC-MS



Work being continued in collaboration with UMN faculty (MISA project) :

- **Finetuning of chemical composition (isolation of pure compounds)**
- **Screening for potential medicinal activity (bio-essays)**

Academic activities in cooperation with the UMN and other US institutions

- **Fulbright Research visiting scholar** :

  1999: UMN, Molecular marker technologies in collaboration with Dr. Gary Muhelbauer

  2008: UMass Amherst, Chemical profiling of MAPs in collaboration with Dr. Lyle Craker

- **International course** on "Sustainable Agriculture in the Mediterranean Environment : Case study in Morocco" (Dr. Steve Simmons, 19 May - 4 June 2000).

- **MAST International program**: exchange program for a group of graduate students from ENA-Meknès. 2000.

- **Communicating for America Exchange Program**: participation of 12 graduates from ENA (2004 -2010).

- **MARL group**: a field tour for a group of professionals from the US "The Minnesota Rural Leadership group" (2012).

Ongoing activities with UMN

MISA Endowed Chair of Agricultural Systems : collaborative partnership among the UMN Extension, ENA –Meknès, IAV H II Rabat and the Rural Tourism Network in Morocco.

GOALS

- Implement faculty and graduate student collaborations.
- Develop an International Leader Engagement program by bringing together agricultural, academic and rural leaders across Minnesota with counterparts in Morocco to work on shared problems in sustainable agriculture.
- Develop a model of an enhanced extension system that tackles issues facing Minnesotans and Moroccans .

Farmer-to-Farmer Morocco Rural Leadership program : collaborative project between UMN Extention and ENA-Meknès to develop a model of rural leadership training

GOAL : develop and provide leadership training that target a cohort of Moroccan farmer leaders.

A group of UMN faculty and professionals on leadership training working with a group of faculty from ENA –Meknès to develop and provide leadership training that target a cohort of Moroccan farmer leaders.

- training-of-trainer component : 4 Faculty from ENA trained
- leadership training component : 20 farmers (10 men and 10 women) trained, each participant representing a different association


Agro-pôle Olivier
Unité de Trituration