ICARDA

Science for resilient livelihoods in dry areas

CGIAR Research Program on Livestock Agri-Food Systems
Feed and Forages Flagship

Expert Meeting Report
Importance of Hedysarum species in Tunisia

Prepared by: Mounir Louhaichi (ICARDA – Tunisia)

Co-authors/contributors/collaborators: Slim Slim (ESAM, Tunisia)

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2020

المدرسة العليا للفلاحة بماطر
Ecole Supérieure d'Agriculture de Mateur
ESAM

Office de Développement Sylvo Pastoral du Nord-Ouest

الغابات التونسية

CGIAR RESEARCH PROGRAM ON Livestock

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Rational

Feed resource shortage is one of the major constraints limiting the development of the livestock sector in Tunisia. The shortage of feed is exacerbated by the low rainfall and recurrent droughts. Working under harsh conditions of low and erratic rainfall, poor soils and pasture conditions, degraded landscapes through gully formations, and persistent droughts. Smallholder livestock farmers in these regions depend mainly on livestock production for their livelihoods.

Under these conditions, the probable increase in aridity resulting from climate change and the various forms of anthropogenic actions (overexploitation and inadequate use of natural resources) constitute important factors in the destabilization of ecosystems, leading to land degradation and loss of biodiversity, sometimes alarmingly accelerating its genetic erosion. Combating degradation processes and restoration of agro-silvopastoral (ASP) ecosystems are a priority for Tunisia.

Among the constraints faced when developing ASP systems is availability of well adapted seeds. Thus, the main objective of the sulla expert meeting is to highlight constraints and possible solutions for the development of the culture of *Hedysarum species* in Tunisia.

The genus *Hedysarum* L. is a group of forage species belonging to the Fabaceaes family. It contains annual or perennial, diploid or tetraploid, autogamous or allogamous species. These species of agronomic interest, thanks to their fodder quality and their ability to improve soil fertility by fixing atmospheric nitrogen, can be exploited to improve degraded pastures. The various species of the genus *Hedysarum*, growing in Tunisia in a spontaneous state, are all palatable and are grazed by the majority of animals. The most widely used species is *Hedysarum coronarium* L. which is cultivated in areas receiving 400 mm and above. The other main two species are *Hedysarum carnosum* Desf. and *Hedysarum spinosissimum*, which offer grazing opportunities during a good period of the year thanks to their regenerative power even under low rainfall.

Note: In 2017, ICARDA with its main partners organized a national workshop on forage and pasture seeds strategy. During which a first draft was developed and presented to concerned parties (Rudiger, 2016).

Topic covered

The agenda covered 5 main topics (Appendix # 1)

- Importance of the genus Hedysarum in pastoral improvement,
- OEP's experience in improving cropping systems by sulla cultivation,
- DGF's experience in improving forest rangelands,
- ODESYPANO's experience in improving rangelands in northern Tunisia,

Attendees

Five institutions were represented during this workshop:

- Direction Générale des Forêts (DGF)
- Office de l'Elevage et des Pâturages (OEP)
- Office de Développement Sylvo Pastorale du Nord-Ouest (ODESYPANO)
- Ecole Supérieure d'Agriculture de Mateur (ESAM)
- International Center for Agricultural Research in the Dry Areas (ICARDA)

Day 1 - Presentations

Dr. Mounir Louhaichi welcomed all participants in the sulla expert meeting and presented the program of the workshop (Appendix 2). He highlighted the importance of sustainable silvopastoral restoration under changing climate and land use. He also stressed the need to select well adapted legume species such as *Hedysarum* species.

Dr. Gouider Tibaoui (DG of ESAM), introduced the importance of the genus Hedysarum in pastoral improvement.

Mr. Fethi Gouhis (Director of Feed Resources at OEP) presented the OEP's experience in improving the cropping systems in Northern Tunisia using *Hedysarum coronarium* (cultivation in private lands).

Mr. Klifa Jallali (Chief Service DGF) presented the DGF's experience in improving Tunisian forest rangelands.

Mr. Moncef Kthiri (Director ODESYPANO) presented the ODESYPANO's experience in improving private and community rangelands in the northern of Tunisia.

Day 2 - General discussion

A general discussion was animated by Dr Mounir Louhaichi (ICARDA) to identify the problems and come on with potential solutions for promoting *Hedysarum* species (*H.coronarium, H. carnosum* and *H. spinosissimum*) cultivation and development.

Several efforts are being made by different organizations and stakeholders through the integration of legumes in the production systems such as intercropping, cover crops and crop rotation can help restore soil health and improve animals feed systems.

Forage or pasture legumes are among the crops capable of using nitrogen in the air to make their own proteins, without the need for nitrogen fertilizers. This specificity, due to a natural symbiosis, must generate an adapted management of the entire cropping system to benefit from all the advantages of this biological process. The introduction of forage legumes also contributes to the diversification of cropping systems, which promotes the biodiversity of ecosystems and the reduction of the use of phytosanitary products. In addition, the various products of these crops used for animal feed can have positive effects on their nutrition and health.

Experience of OEP with *Hedysarum coronarium*

In the absence of the intervention of the seed sector in the country, the OEP is the only producer of seeds for *Hedysarum coronarium* (Appendix # 2). On average around 200 tons of seeds are produced each year.

Advantages of sulla cultivation

1. Agronomic potential and environmental impact

- Legumes are nitrogen fixing plants that can be beneficial for soils, improving their growing conditions as well as those of other plants. This nitrogen from the air naturally enriches the soil, thus saving the use of synthetic fertilizers each year. Legumes also help sequester carbon in the soil and allow better filtration of water.
- Soils and legumes provide a unique symbiosis that protects the environment, improves productivity, helps efforts to adapt to climate change, and provides essential nutrients to soils and other crops.
- Contributes to the conservation of water and soil.

2. Zootechnical potential

- A source of protein for animals which allows significant savings in concentrated protein feed, and quality pasture for bees
- Improvement of the nitrogen quality of fodder which results in the reduction of the import of concentrate
- However, despite these advantages, the use of forage legumes in Tunisia remains limited by several constraints:
  - Low adoption of varietal creation by seed organizations
  - Non availability of seeds at the level of distribution channels
  - Poor mastery of cultivation techniques
  - Lack of popularization on the importance of legumes in agro-pastoral systems

Problematic

Tunisian agro-silvopasture production systems are subject to climatic (frequent drought), socio-economic challenges (governance) and technical constraints (loss of soil fertility, overgrazing) resulting in:

- Steady land degradation (acidification, erosion and desertification)
- Biological degradation (reduction of plant and animal biodiversity, disappearance of desirable/palatable species and appearance of undesirable species)
- Deficit in livestock feed resources
- Lack of crop rotation (application of monoculture in the north) and lower yields
- Loss of soil fertility
- Reduced profitability of animal production
- Decrease in farm income which impact livelihood of mainly small holder farmers

Constraints of seed system

- A lack of long-term seed strategy from government due to it changing from year to year, resulting in no planning guaranty for seed companies,
- Difficult to obtain royalties from INRAT, particularly for new enterprises,
- Not enough irrigated land available for seed production,
- It was economically more interesting to import and sell seeds compared to producing new varieties locally, as royalties were very expensive,
- A lack of monitoring and control of local seed multiplication,
- Lack of pasture seed multipliers in spite of some research achievements,
- No pastoral varieties registered in the official catalogue.

Recommendations

Among the legumes, the use of Hedysarum species (*Hedysarum coronarium*, *Hedysarum carnosum*, *Hedysarum spinosissimum*) which play fundamental role in the environmental protection of soils and fodder and pastoral production in Tunisia. Indeed, these species can balance forage systems, improve production systems and enrich rangelands. Only the *H. coronarium* is cultivated in the north of the country through development projects.

Other interesting native species, in particular *H. carnosum* and *H. spinosissimum* can contribute to the improvement of forage supplies and production systems in arid and semi-arid zones.

A program for the collection, evaluation and multiplication of these native species must be put in place by the various stakeholders.

Hedysarum coronarium

- Redo the selection scheme and ensure the mother seeds for the multipliers
- Continue studies on technical itineraries for sulla cultivation, mainly dry and wet conservation of fodder

Hedysarum carnosum and *Hedysarum spinosissimum*

- Creation of the localization map of spontaneous development zones (with database: soil, climate, topography,) DGF + BNG + ESAM + OEP + ODESYPANO + ICARDA,
- Establish an annual program for the protection, collection and conservation of seeds between OEP + DGF + BNG + ICARDA,
- Characterization and evaluation of the seeds collected, the objective of which is to create a synthetic variety by ESAM,
- Multiplication of seeds collected in the El Grine center (Kairouan),
- Capacity building for technicians (group training and on the job training) ESAM + ICARDA.

Recommendations for the seed sector

- Tunisia needs private enterprises to multiply seeds and satisfy the demand as most seeds were imported, Government needed to stop subsidies as farmers were selling subsidized seeds to large scale farmers,
- Government needed to withdraw from seed market and leave it totally to the private sector,
- Better coordination and monitoring between government structures such as OEP and CNDR was needed to improve and harmonize seed subsidy programs.
- Open borders for export of locally produced forage seeds, once the local market was satisfied,

- Price fixation for seeds needed to be done in advance for forage and pastoral seeds, just like for cereals,
- More training and equipment for seed producing farmers,
- More attention needed to be given to ray grass research,
- Tunisia could be a regional platform for the production of fodder and pasture seeds.

Conclusion

Overall, the seed sector in Tunisia has undergone sustained development and growth in recent years, which have resulted in the creation of a quality national plant genetic heritage, the introduction of appropriate regulations, the increasing use of quality seeds by farmers and the emergence of private operators and professional associations. However, in recent years, this development seems to be slowing down, leading to its stagnation or regression. This workshop brought together the active actors. It presented an opportunity for the exchange of experiences and ideas to improve this sector with emphasis on Hedysarum species. A draft *Hedysarum* action plan (Appendix 3) was produced to start the fieldwork and experimentation with the collaboration of the various participating organizations and partners. In short, this expert meeting can only endorse the diagnostic and recommendations made during the 2016 national workshop.

Acknowledgements

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Further readings

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Appendix 1. Program of the meeting

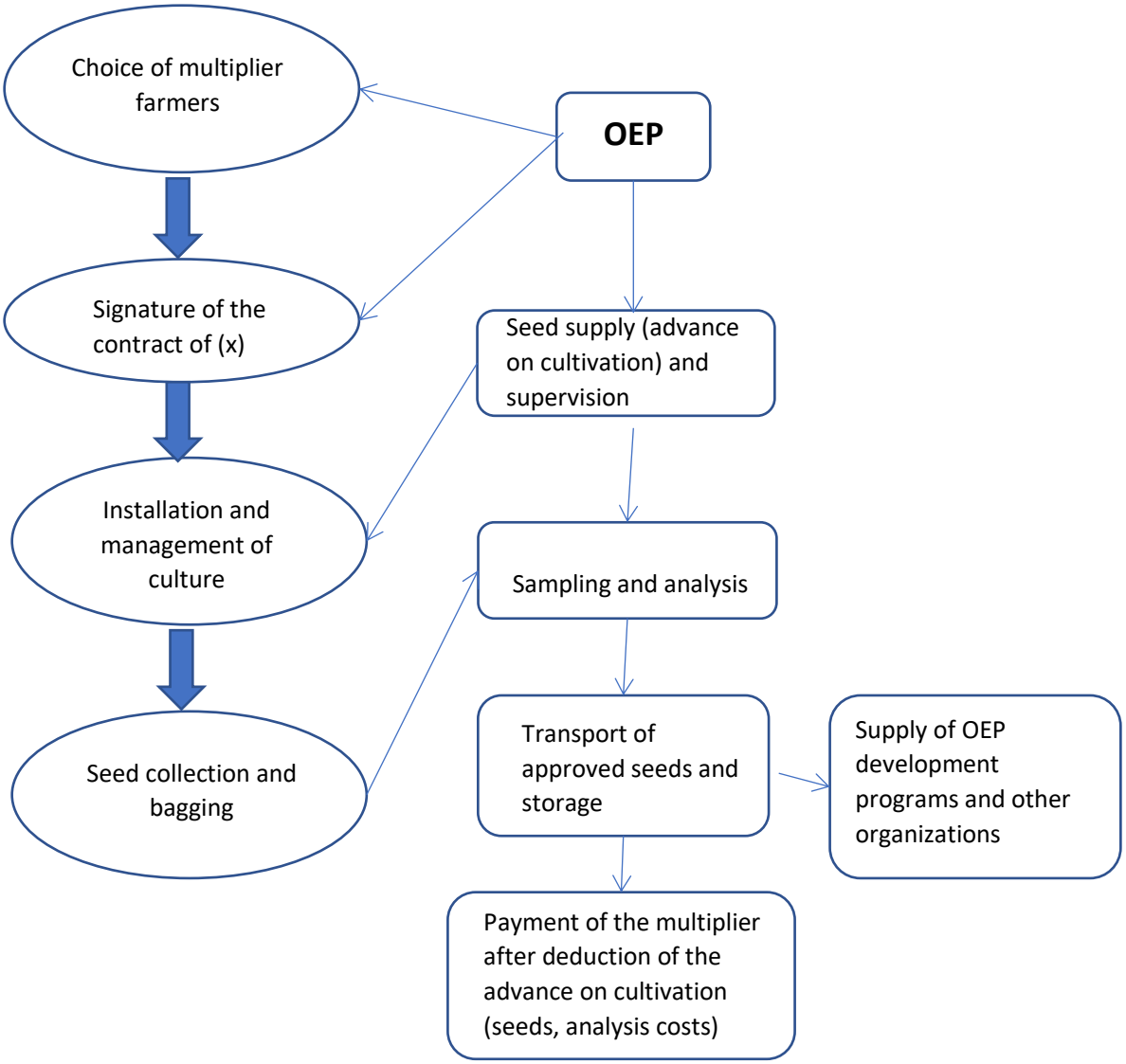
ICARDA Science for resilient livelihoods in dry areas — ESAM — IRESA — CGIAR RESEARCH PROGRAM ON Livestock

Expert meeting :
Importance du genre sulla dans l'amélioration des parcours
Golden Tulip- Hammamet, 2-3 septembre 2020

Programme : Expert meeting : Importance du genre sulla dans l'amélioration des parcours

Mercredi 2 Septembre 2020		
09:00 – 09:45	Introduction Générale: Importance du genre *Hedysarum* en amélioration pastorale	Tibaoui + Ben Jeddi ESAM + INAT
09:45 – 10:30	Expérience de l'OEP dans l'amélioration des parcours	Fethi Gouhiss OEP
10:30 – 11:00	Pause café	
11:00 – 11:45	Expérience de la DGF dans l'amélioration des parcours forestier	Jamel Kailen DGF
11:45 – 12:30	Expérience de l'ODESYPANO dans l'amélioration des parcours	Hichem Khemiri ODESYPANO
12:30 – 13:00	Discussion	Group
13:00 – 14:00	Déjeuner	
14:00 – 16:00	Identification des problèmes	Group
16:00	Pause-café	
Jeudi 2 Septembre 2020		
09:00 – 10:30	Discussion Générale	Group
10:30 – 11:00	Pause-café	
11:00 – 13:00	Formulation du rapport final et des recommandations	Group
13:00 – 14:00	Déjeuner	
14:00	Départ	

Appendix 2. Seed production diagram of *Hedysarum coronarium by OEP*



Appendix 3 Hedysarum action plan

Action	October 2020	November 2020	December 2020	January 2021	February 2021	March 2021	April 2021	Mai 2021	Jun 2021	July 2021	August 2021	Organizations
Repeat the selection scheme of Sulla North												OEP-INRAT-ESAM
Development of conservation techniques for Northern Sulla by dry method (bursting of stems)												OEP-INRAT-ICARDA-ESAM
Creation of the distribution map of the genus *Hedysarum (carnosum* and *spinosissimum*)												OEP- DGF-ODESYPANO-INRAT-ICARDA-ESAM-BNG
Capacity building (gender and species recognition, collection techniques, data processing, etc.)												INRAT-ESAM-ICARDA
Collection and conservation of sulla seeds (*carnosum* and *spinosissimum*)												
Multiplication of seeds collected at the El Grine center	**from October 2021**											**OEP**