# Performance of the Quaker International oat nurseries under Moroccan ecological conditions

SAIDI N., C. AL FAIZ and A. IDRISSI SALIH

INRA, breeding and conservation of plant genetic resources unit, P. O. Box: 6570, Rabat-Institut, Morocco. Email: nezsaidi@yahoo.fr, faizchawki@yahoo.fr

## Summary

In Morocco, Oats occupy 86 000 ha, cultivated in the rainfed areas. Due to their importance, INRA-Morocco has initiated a national programme in 1980s to select new oat varieties from introduced material, based in majority from the International Quaker Oat nursery (ION). Currently, around 16 cultivated oat varieties are registered in the official catalogue. Most of these varieties were selected among the ION material, after being tested under Moroccan soil and climate conditions. Since we started receiving annually a nursery of around 200 lines from Quaker-ION, we succeeded to select around 17-20 % of the total nursery annually. This is a valuable material that contribute efficiently to the development of oats cultivation in Morocco.

*Keywords: Oats, Quaker International Oats Nursery, Morocco.*

### Introduction

Oats are a Mediterranean region crop. In Morocco, they are cropped in pure stand (86 288 ha) or in mixture with vetch (12 953 ha), mainly in rainfed areas. They are used as green fodder, hay, grain or silage. Oats contribute of about 36% of the total forage production in Morocco. The national production of oats is of 2 150 600 T of fresh matter as a pure stand and of 305 300 T of fresh matter as a mixture oats/vetch.

The National Institute for Agronomic Research (INRA), Morocco has launched in 1980s a breeding programme to select oats varieties adapted to Moroccan ecological conditions. Around 16 oats varieties are registered. Most of these varieties were selected from the Quaker International Oat Nurseries (Quaker-ION), where more than 200 ION lines are annually tested at INRA experimental stations for yield, disease resistance and earliness.

### Material and Methods

Three Quaker-ION oat collection received successively in 2004, 2005 and 2006, having 218, 276 and 229 lines respectively. All the collections were evaluated at Marchouch experimental station of INRA located at 68 km SE of Rabat, Morocco:

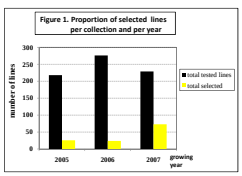
- ✓Altitude: 410 m ,
- ✓ Longitude: 6° 71 600 W
- ✓Latitude: 33° 60 499 N,
- ✓Average annual rainfall: 407 mm,
- ✓Soil type: black crumbling soil.

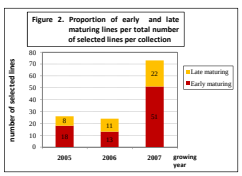
Trials design: each line is sown in a single row of 2m length interspaced by 60 cm and in one replication.

Scored data: earliness, resistance to diseases under natural infection (BYDV, crown rust, powdery mildew, etc), plant height, fresh and dry matters yields and seed yields.

### Results and discussion

From the tested collections, 12 %, 9 % and 32 % of the total lines were selected from the 2004, 2005 and 2006 collections respectively. Most of the selected lines were early maturing ones (Figures 1&2). The average annual rainfall per year was of 236,21 mm during 2004, 428,88 mm during 2005 and 180,47 mm during 2006.




Average days to heading was varying for each collection due to the climatic variations. It was of 129 ± 0.59 for 2004 collection, 130 ± 0,47 for 2005 collection to 141 ± 0,47 for 2006. Average grain yield per collection was higher for 2005 (639 ± 9,88) and 2004 (353 ± 10,4) collections, but lower for 2006 collection (185 ± 5,2) (Table. 1). Disease screening showed some resistant/tolerant lines to powdery mildew (Graph 2) and helminthosporiose (Graph 3). Selection has occurred within the group lines marked by a circle.

**Table 1. Results for statistical analysis of the heading period, average plant height and grain yield data per collection**

| | 2004 collection | | | 2005 collection | | | 2006 collection | | |
|---|---|---|---|---|---|---|---|---|---|
| | Heading period (days) | Average Plant height (cm) | Grain yield (g) | Heading period (days) | Average Plant height (cm) | Grain yield (g) | Heading period (days) | Average Plant height (cm) | Grain yield (g) |
| Mean | 1295 | 122,06 | 352,9 | 140,99 | 146,81 | 639,38 | 129,38 | 74,24 | 184,7 |
| Standard error of mean | 0,59 | 0,99 | 10,4 | 0,47 | 0,61 | 9,88 | 0,82 | 0,66 | 5,2 |
| Coefficient of variation (%) | 6,76 | 12,01 | 43,4 | 5,61 | 6,86 | 25,67 | 9,54 | 13,48 | 42,7 |

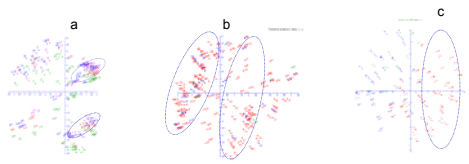



**Figure 3. screening for powdery mildew of 2004 (a), 2005 (b) and 2006 (c) nurseries.**

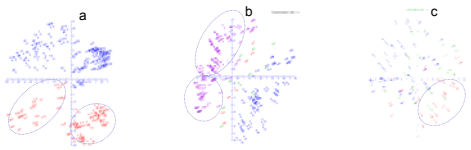



**Figure 4. screening for helminthosporiose of 2004 (a), 2005 (b) and 2006 (c) nurseries.**

Concerning screening for BYDV during the first year of evaluation, the tested lines did not show any symptoms and therefore, no selection for resistance/tolerance was realised for that character. However, a re-evaluation of the material was undertaken in different locations where the infections by the virus are more frequent.

Final selection based on all these traits, has resulted in a group of lines which will be evaluated for biomass and grain yield in advanced trials, during the following seasons. This evaluation is undertaken in different locations representing the target areas for oats cultivation in Morocco (Northern region, central plains and mountains).

### Conclusion

The Quaker nurseries are a valuable material since it contains high diversified genetic material from which we could select many lines for different target regions. Our objective in the near future is not only to focus on disease resistance or high yielding genotypes but to select for seed quality (high protein content, high oil content and high β-glucan content) and earliness as well, since the period of drought has become more longer than few years ago leading to the reduction of plant's cycle.

Advanced yield trial of selected lines including some Quaker- ION lines (Marchouch experimental station, 2005)

**References:**

Al Faiz Chaouki, S. Saidi et G. Jaritz. 1997. Avoine fourragère (*Avena sativa* L.).Pp. 209-224. In : Production et utilisation des cultures fourragères au Maroc 389 p. Ed. (1997) INRA, Rabat, Maroc

Stevens E. J., K. W. Amstrong, H. J. Bezar, W. B. Griffin and J. G. Hampton. 2004. Fodder oats: an overview. Pp. 11-36. In: Fodder oats: a world overview.

Moroccan annual report on the assessment of forage crops agricultural cropping season 2005/2006. Ministry of agriculture and rural development of Morocco.