

DC-DC-FP2-5.FP2-5-12 - Use of hotspots for screening of each disease / pest.

1. Identification of novel sources of resistance in barley to foliar pathogens, barley yellow dwarf virus and barley stem gall midge in disease prone environments.
2. Advance breeding lines, barley accessions from 6-FIGS subsets (NB, PM, YR, SC, SR, SR), and GCP subset was evaluated for yellow rust, net blotch, powdery mildew and leaf rust in disease hotspots (Morocco, India). Furthermore, a FIGS subset for barley yellow dwarf virus (BYDV) and a FIGS subset for barley stem gall midge was screened in Tunisia and Morocco, respectively.
3. A FIGS subset of yellow rust of 298 accessions was screened in the field in Durgapura, Jaipur (India) with artificial inoculation with an inoculum consisting of a mixture of 5-pathotypes. Based on the area under disease progress curve (AUDPC), 183 accessions (AUDPC < 200) were found to be resistant (Figure 1).

The FIGS subsets of net blotch (80), scald (95), powdery mildew (259), leaf rust (107), yellow rust (72), and the GCP-subset (224) were also screened in the field under natural disease pressure at the INRA-Morocco agriculture research stations of Sidi Allal Tazi (34° 52' N, 6.32 W; Table 2) and Marchouch (33°56 N, 6°63 W; Table 3). Sidi Allal Tazi is the hot spot for barley leaf rust with high disease incidence and severity. The barley accessions with CI (0-10) were considered highly resistant (Table 2). Furthermore, about 2,500 advance breeding lines were screened for adult plant resistance to leaf rust (LR) at Sidi-Allal Tazi research station in Morocco and 58-advance breeding lines were found to be resistant to leaf rust despite heavy inoculum load.

From the evaluation of BYDV FIGS subset in Tunisia, 34-accessions were found to be resistant. A FIGS-subset of barley stem gall midge (339 accessions) was evaluated in Jemaa Shaim (Morocco) in 2015 and seven accessions showed no infestation to this pest. These seven accessions were re-screened under artificial infestation in the greenhouse in 2016 and unfortunately, all these accessions were found susceptible to the BSGM. Efforts will continue to look for sources of resistance to this pest using FIGS.

4. The barley accessions with novel resistance to diseases and pests will be incorporated into the barley breeding program of ICARDA and NARS partners.

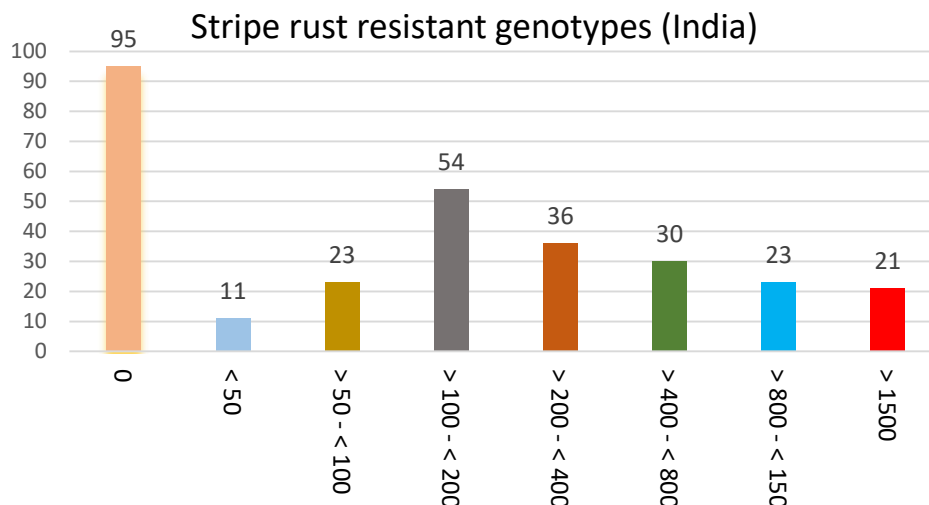


Figure 1. Yellow rust FIGS subset screened with yellow rust in Durgapura, India.

Table 2. Response of different FIGS subsets and GCP to leaf rust at Allal Tazi research station of INRA, Morocco.

CI	Leaf rust	Stem rust	Stripe rust	Scald	Net blotch	GCP
0 - 10	45	6	11	37	28	36
10 - 20	15	23	19	12	10	22
21 - 30	11	7	10	15	10	27
31 - 40	1	0	0	0	0	2
41 - 50	10	13	5	4	17	44
51 - 60	1	0	0	0	0	0
61 - 70	0	6	0	0	17	40
71 - 80	0	0	0	0	0	0
81 - 90	0	0	0	0	0	0
91 - 100	1	3	0	2	1	28
# of genotypes	84	58	45	70	83	199

Table 3. Response of different FIGS subsets and GCP to powdery mildew and net blotch at Marchouch research station of ICARDA in Morocco.

Name of the subset	# of accessions	Resistant to NB	Resistant to PM
FIGS- Net blotch (NB)	80	22	45
FIGS-Scald (SC)	95	19	31
FIGS- Leaf Rust (LR)	107	18	30
FIGS- Powdery Mildew (PM)	259	96	82
FIGS-Yellow Rust (YR)	72	31	38
GCP	224	66	72