INTRODUCTION

Late blight caused by Phytophthora infestans is one of the most serious diseases of potato worldwide. In Algeria the disease is very common on potato, but has also been reported on tomato in some areas of the country. During 2008-2014, the late blight has reached epidemic proportions in many potato-growing areas in the north west of Algeria, an emerging potato production region. Consequently, heavy yield losses were recorded despite the excessive use of fungicide. In order to understand the population of pathogen in north west Algeria, a total of 161 P. infestans isolates collected on potato and tomato from 2008-2014 were characterized for the mating type, the level of metalaxyl sensitivity (n=92) and their genotypic diversity with microsatellite markers (n=117).

MATERIALS AND METHODS

Samples were collected during 2008-2014 from potato crops grown in the field and tomatoes grown in the field and greenhouses, located in different sites in north west Algeria (Fig. 1).

• The mating type of the isolates was determined by pairing them with reference isolates of A1 and A2 mating type on pea medium. After 11-15 days of incubation at 15°C, plates were examined microscopically for the presence of oospores in the hyphal interaction area between the isolates paired.

• The sensitivity to metalaxyl was determined by the isolates’ ability to grow and sporulate on potato leaf discs at different concentrations (0, 10, 100 mg/L). Isolates sporulating on the discs floating on water containing 100 mg/L metalaxyl were rated as resistant (R), those on 10 mg/L were rated as intermediate (I) and those that sporulated only on water were considered sensitive (S).

• The genotypic diversity was analyzed using simple sequence repeats (SSR) markers: Pi02, Pi48, G11, Pi04, Pi63, Pi70, D13, SSR2, SSR4, SSR6, SSR8 and SSR11.

RESULTS

• A mating type assay showed that 70 % isolates were A2 mating type and 30 % were A1 mating type. Both mating types were sometimes found in the same field.

• A high percentage of resistance to metalaxyl (89%) among isolates was detected. Metalaxyl resistant phenotype was present in both mating types with a higher percentage among A2 mating type isolates.

Figure 2: Mating type test Figure 3: Metalaxyl sensitivity test

Figure 4: Frequency of mating types (A1, A2) among Phytophthora infestans isolates from north-western Algeria during 2008-2014

Figure 5: Metalaxyl resistance among Phytophthora infestans isolates from the northwestern Algeria during 2008-2014

CONCLUSIONS

• Phytophthora infestans population in north-western Algeria is mainly composed of the A2 mating type isolates associated with the clonal lineage 13_A2 and A1 isolates of 2_A1 and 23_A1.

• The coexistence of both mating types in most of the sampling sites means that sexual reproduction and the production of oospores may occur in this region.

• The high level of metalaxyl resistance in P. infestans population suggests that the use of metalaxyl formulations should be carefully planned in late blight management in Algeria. This study is a preliminary contribution to the worldwide effort to characterize P. infestans and it provides some information on the pathogen population in strategic region of Algeria. Further investigations are required to establish a complete structure of the entire population of this pathogen, especially on tomato and thus complete the map of all the production areas.

Figure 6: Genotype frequency of Phytophthora infestans isolates collected from north-western Algeria during 2008-2014

Figure 7: Sub-groups frequency analysis of the genetic 13_A2 lineage of Phytophthora infestans isolates collected from north-western Algeria during the period of 2008 to 2014

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