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CA-I-63

Genetic transformation of Moroccan bread wheat by biolistic using plasmid pBY52□containing barley □VA1 gene

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Background: Wheat is the most important cereal crop and a staple food in Morocco. The average annual per capita consumption of cereals in Morocco is estimated at over 200 kg per person. Drought is the most important environmental stress affecting the wheat crop, causing a severe decrease in performance. Moreover, the transfer of resistance to abiotic stresses such as drought, using traditional approaches is limited because of the complexity of the characteristics of tolerance. However, genetic transformation can help in improving this trait, while overcoming the difficulties of classical improvement. Therefore, this study was formulated with the objectives of genetic transformation of Moroccan bread wheat variety ('Marchouch') with gene known to be involved in drought tolerance (barley HVA1 gene carried by plasmid pBY520).

Methods: Immature embryos as explants from Moroccan bread wheat variety ('Marchouch') were excised for callus induction. Plasmid pBY520 (carried by *E. coli* strain construct) containing HVA1 gene was extracted and we performed the genetic transformation by biolistic technique. After shooting, the transformed embryos were selected, multiplied and finally regenerated into plantlets. The confirmation of gene integration by molecular biology techniques was carried out using PCR techniques.

Results: The percentage of induction of embryogenic tissue calculated one week after the bombardment was 94%. After selection, 18% of callus survived. Thirteen plantlets were obtained from callus selected and were confirmed as transformed by the PCR using primers 35S and Bar highlighting the integration of the gene HVA1.

Conclusion: Transgenic plants obtained encouraged us to continue research using physiological analysis in order to assess the expression of this gene of drought tolerance integrated in bread wheat.

Keywords: Bread wheat; HVA1 gene; Drought tolerance; Genetic transformation; Plasmid pBY520.

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Optimising Subsidiary Crop Applications in Rotations (OSCAR): A Perspective for the North Africa Region

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Background: For sustainable improvement of wheat-based farming systems in the North Africa, there is a need to improve plant health, soil health and fertility. One approach to achieve this is by integrating subsidiary crops (SC) as living or dead mulches or cover crops with the main crops in rotations, which will increase plant species and microbial diversity and reducing water demand in dry climates.

Methods: A collaborative research project funded by EU FP 7 (Project No. 289277) was initiated in April 2012, in partnership with European Union (public research organizations and private sector small and medium enterprises of Germany, Norway, Sweden, Denmark, the Netherland, UK, Poland, Switzerland and Italy), Brazil and Morocco (INRA-Morocco and ICARDA), in order to enhance understanding and use of SC systems, develop suitable farm technologies, increase the range of SC species, and enhance understanding of impact of SC on soil ecology, biology and microbial diversity and crop pests and diseases.

Results: Based on two field experiments in Morocco (Sidi Al-Aidi and Sidi Allal-Tazi), the project will assess the economic and ecological impact including legume root health and soil health, fertility and microbial diversity and compare the results with other sites in Europe. Screening of new species and genotypes will result in identification of range of potentially useful plant species for SC for the North Africa and Europe. The identified SC species will be tested for their potential as forage and for extraction of useful biochemicals.

Conclusion: The results of the project as a whole will be of use for and improve sustainability in low-input, organic, and conventional farming systems in the North Africa, Latin America and Europe.

Keywords: Subsidiary crops, Plant health, Soil health, Microbial diversity.

CA-I-65

Rôle des protéines et des enzymes antioxydants dans la résistance des jeunes plantules de cyprès de l'Atlas *(Cupressus atlantica* G.*)* au stress hydrique

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Contexte: Le cyprès de l'Atlas (*Cupressus atlantica* G.), espèce endémique du Haut Atlas Occidental, est sans doute, l'une des espèces forestières du Maroc ayant la plus grande potentialité sylvicole alors que son aire naturelle serait limitée à environ 6000 ha. Le cyprès de l'Atlas présente dans toute son aire de répartition une absence presque totale de régénération naturelle à cause des sécheresses épisodiques connues dans ces régions et de la surexploitation humaine. La présente étude porte sur l'évaluation des effets d'une inoculation avec un complexe mycorhizien sur la résistance des jeunes plants de cyprès de l'Atlas à un stress hydrique.

Méthodes: Un régime hydrique a été appliqué aux plantules du cyprès de l'Atlas en conditions contrôlées pendant quatre mois, et le suivi de la croissance et de la réponse physiologique et biochimique des plantules a été réalisé.

Résultats: Les résultats préliminaires ont montré que l'inoculation avec le complexe de champignons mycorhiziens a un effet significatif ($p<0,05$) sur la croissance des jeunes plants de Cyprès de l'Atlas quel que soit le régime hydrique par rapport aux plants non mycorhizés stressés ou non. Les jeunes plants de Cyprès de l'Atlas ont montré un ajustement osmotique en réponse au stress hydrique. Les jeunes plants inoculés et non inoculés ont été comparés par rapport à leur capacité à accumuler la proline, les sucres solubles totaux, PO, PPO, PAL et CAT dans leurs feuilles sous stress hydrique, les teneurs obtenues ayant indiqué la résistance des jeunes plants mycorhizés au stress hydrique par rapport à ceux non mycorhizés.

Conclusion: Il ressort aussi de cette étude que l'inoculation des jeunes plants par un complexe