The Effect of Chemical Scarification and Washing on the Germination of *Ferula ovina* Seeds

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Key words : *Ferula ovina* ,germination ,dormancy ,washing ,ethanol , H_2SO_4 , HNO_3

Introduction Germination is a critical stage in the life cycle of weeds and crop plants , and often controls population dynamics , with major practical implications . Washing (with cold water) has been one of methods the traditionally used to break seed dormancy (Frisby and Seeley , 1993 ; Nadjafi *et al* , 2006) . The chemicals which are used commercially in various places include : potassium nitrate , thiourea , sulfuric acid , ethanol and Cyanamid . All of these chemicals are inexpensive and can be used easily to break the true dormancy of seeds effectively (Chang and Sung , 2000) .

Materials and methods Germination experiments were conducted using four replications of 20 seeds per each treatment . Seeds were placed on double layered Watman No .1 filter paper moistened with 5 ml of distilled water in sterilized Petri dishes . Treatments were as follows :

Chemical scarification Seeds of *F .ovina* were soaked in HNO_3 (25% v/v) at three times (10 , 30 , 60 min) , H_2SO_4 (75% v/v) for 5 minute and Ethanol (96% v/v) then washed thoroughly with distilled water , before transfer to the germination test process .

Washing and chilling Seeds were washed every day thoroughly in running water and kept at 2℃ for 7 days .

Statistical analysis : At first , raw data were tested in SAS software for normality test and Root square transformation method was employed for data transformation . Then the data were analyzed through analysis of variation (ANOVA) and the Duncan ($P<0.05$) statistical method .

Results and discussion All treatments had a significant effect on the seeds germination ($P<0.05$) . Untreated seeds (control) did not germinate . In general , *F .ovina* seed germination was low in all the treatments , although washing had a positive effect on germination . The results suggest that *F .ovina* has deep exogenous and endogenous dormancy . The results achieved are presented in Fig . 1 .

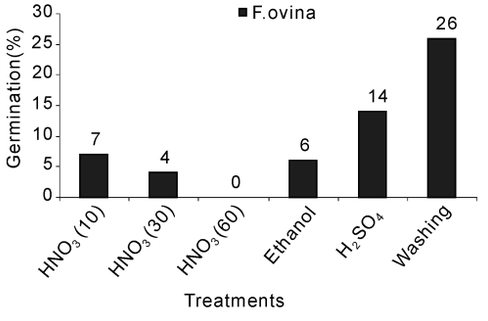

Figure 1 *Effects of HNO_3 at three times (10 , 30 and 60 minute) , Ethanol , H_2SO_4 and Washing on seeds F .ovina specie .*

Conclusions The results showed seed germination decreased with increased soaking time in HNO_3 . No seeds germinatedat 60 min soak in HNO_3 . The response to HNO_3 at different times was very low . HNO_3 for 10 and 30 min resulted in germination of 7% and 4% , respectively . Ethanol did notimprove seed germination . Nadjafi *et al* . (2006) achieved similar results . The results showed *F .ovina* seeds have a deep state dormancy and a stronger method is needed to break seed dormancy such as hormones ABA and GA .

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