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**Keywords:** strains, seed treatment, hard seeds rate, germination rate.

## Introduction

*Melilotoides ruthenica* is a perennial legume, and is characterized by cold resistance, drought resistance and high protein content (Luo 1993). It is used for hay and as a pasture plant, but because a high percentage of the seed are hard-seeded to allow reliable germination, seedling production is hindered (Duet *et al.* 2007).

The objective of this research was to study the effect of sulfuric acid treatment on hard-seeds of *M. ruthenica* and determine the optimal treatment concentration and treatment time.

## Methods

Three strains (00-61, 00-81, 90-36) of *M. ruthenica* were studied. Seeds were soaked in 40%, 70%, 98% sulfuric acid, each for 5, 10, 15, 25, 30, 40, 60 min, then rinsed in running water. Three replications of 100 seeds per treatment were then sown in petri dishes, with non-treated seeds used as control. The number of germinated seeds were observed at 14 days. Germination and hard seeded rates were calculated. Statistical analyses were conducted using SPSS ver.11.5 and SAS8.2.

## Results

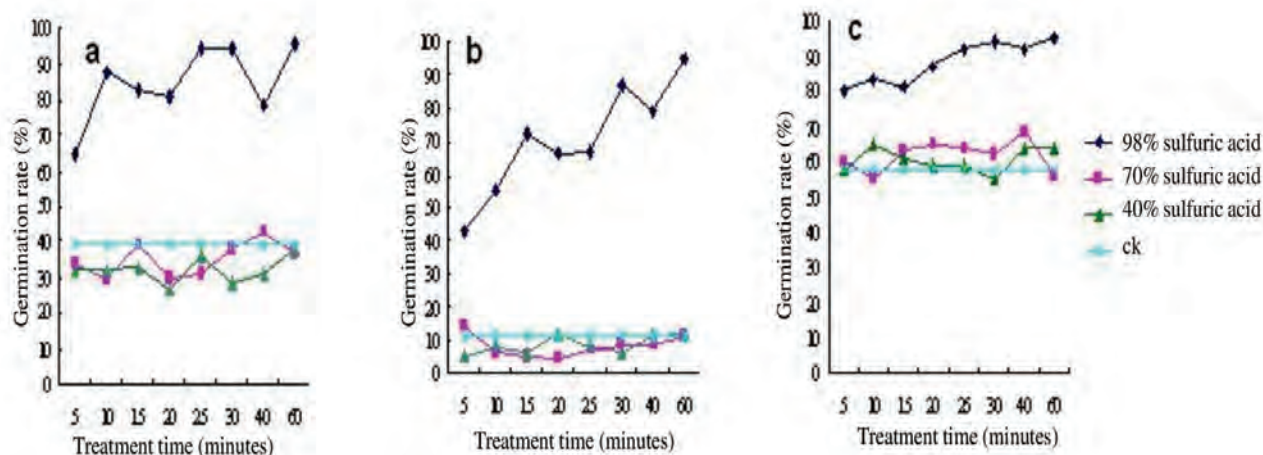
The germination rate of *M. ruthenica* strain 00-61, 00-81

and 90-36 is 39% (Fig. 1 a), 11% (Fig. 1 b), and 58% (Fig. 1 c), respectively before treatment. All diluted sulfuric acid treatments had little effect on germination, but 5-60 minutes of 98% sulfuric acid treatments significantly increased the germination rate of strain 00-61, 00-81 and 90-36 to 65%-96%, 43%-95%, and 80%-95%, respectively (Fig. 1 a,b,c).

The hard-seeded rate of strain 00-61, 00-81 and 90-36 before treatment was 60%, 89%, and 38%, respectively. Each of 5,10,15,20,25,30,40, and 60 minutes treatment of 98% sulfuric acid decreased the hard seeds rate to 32%-4%, 57%-5%, 19%-2% for the different strains of *M. ruthenica* (Table 1).The 30, 40 and 60 minutes treatment are more effective on all of the strains.

## Conclusion

Diluted sulfuric acid treatments had little effect on germination of *M. ruthenica*. All treatments of 98% sulfuric acid reduced hard-seed percentage and increased germination percentage significantly ( $P<0.05$ ). All treatments of 98% sulfuric acid reduced hard-seed percentage and increased germination percentage significantly ( $P<0.05$ ). The optimal treatment time in sulfuric acid was 30-60 minutes, hard seeds can be reduced to lower than 13%, and maximum germination of 95% ~ 96% was reached.



**Figure 1.** The effect of sulfuric acid treatments on Germination rate of the three *Melilotoides ruthenica* strains of 00-61(a), 00-81(b) and 90-36(c).

**Table 1. The effect of 98% sulfuric acid treatment on hard seeds rate (%) of *Melilotoides ruthenica* strains.**

Treatment time(min)	Strain00-61	Strain 00-81	Strain 90-36
ck	60	89	38
5	32	57	19
10	12	26	24
15	16	28	16
20	19	34	8
25	5	33	8
30	5	13	6
40	21	8	6
60	4	5	2

## References

- DuBH, ShiFL, XilinTN, et al.(2007) Study on morphology and anatomy during *Melilotoides ruthenicus* seed development. *Seed* **26**(6):7-11.
- Luo XY (1993) The characters of *Melissitus ruthenicus* C. W.Chang and its further utilization. *Pratacultural Science* **6**, 24-26.