Alfalfa Organic Seed Production in Central Italy

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Introduction The European Union has about 140 ,000 organic farms , collectively covering about 5 .8 million ha . Italy , with 0 .95 million of ha , has the fourth largest area in the world (Willer and Yussefi , 2006) . Alfalfa (*Medicago sativa* L .) is an essential forage crop in the Italian organic system , and organic farmers need seed from well-adapted varieties . The ability of a cultivar to give a high seed yield determines the competitive selling price , a key factor for its effective distribution (Falcinelli , 1999) . In Italy , seed is harvested frequently on the second cut of the final year of the alfalfa rotation . In this study , seed yield and seed yield components of alfalfa populations were evaluated in dense stands under organic management .

Materials and methods The trial was established in March 2005 in Perugia (Central Italy) . Twenty cultivars of alfalfa were grown under organic conditions (Table 1) in dense stand plots of 6 m^2 at a seeding rate of 35 kg ha^{-1} in a randomized block design with four replications . The following traits were recorded : number of plants per m^2 on April 2007 ; dry matter yield (sum of three years) tha^{-1} ; seed yield (in 1 m^2) $kgha^{-1}$; thousand seed weight (g) ; stem number (in 25 cm x 25 cm) ; mean number of inflorescence ; mean number of flowers per inflorescence ; number of ovules per ovary ; raceme number ; legume number per raceme ; seed number per raceme . Analysis of variance and phenotypic correlation were performed .

Table 1 *Alfalfa populations grown under organic conditions and origin .*

1-Prosementi (*) (N-Italy)	11-Marchigiana _ B (**) (C-Italy)
2-Lodi(*) (N-Italy)	12-Casalina(*) (C-Italy)
3-Classe(*) (CN-Italy)	13-La Diana(***) (CNEurope)
4-PR57N02(*) (USA)	14-Verbena(***) (CNEurope)
5-Cremonese _ A(**) (N-Italy)	15-Selection TF5423(***) (C-Italy)
6-Romagnola _ A(**) (CN-Italy)	16-Costanza(*) (N-Italy)
7-Marchigiana _ A(**) (C-Italy)	17-MSI004(***) (N-Italy)
8-Perugino(**) (C-Italy)	18-MSI001(***) N-Italy)
9-Cremonese _ B (**) N-Italy)	19-Cuore Verde(*) (C-Italy)
10-Romagnola _ B (**) (CN-Italy)	20-La Torre(*) (N-Italy)

(*) variety ; (**) landrace ; (***) candidate variety ; C = Central ; N = Northern

Results ANOVA results (Table 2) showed statistically significant differences among the cultivars with respect to dry matter yield and seed yield . Dry matter yield varied from 24 .73 tha^{-1} (Marchigiana _ B) to 19 .45 tha^{-1} (Verbena) . As regard as to seed yield , Perugino landrace showed the highest value (148 ,80 $kgha^{-1}$) whereas Costanza variety performed the poorest (40. 00 $kgha^{-1}$) . Figure 1 shows a significant correlation ($r = 0.34^{**}$) between seed yield and dry matter yield . Perugino (8) , Marchigiana _ B (11) , and Romagnola _ B (10) , showed good performances with respect to seed and forage production . There were statistically significant differences among alfalfa cultivars on the number of plants per m^2 , with Romagnola _ B and Prosementi showing the highest scores , 5 .65 and 5 .56 respectively . Moreover La Diana showed the highest stems number per inflorescence (27 .25) , whereas Romagnola _ B the lowest (10 .25) ; however this last landrace showed the highest number of flowers per raceme (23 .03) . Seed yield showed a significant and positive correlation with number of inflorescence per raceme and with number of raceme per stem ($r = 0.38^{**}$ and 0.35^{**} , respectively) .

Table 2 *Mean and mean squares from morphological traits of 20 alfalfa populations .*

Traits	Mean	Entry(df = 19)
Dry matter yield (tha^{-1})	22 .29	10 .62**
Seed yield ($kgha^{-1}$)	74 .75	29 .95**
Number of plants per m^2	5 .10	0 .55*
Thousand seed weight (g)	2 .19	0 .08 ns
Stem number	15 .66	50 .95**
Number mean of inflorescence	8 .84	27 .84 ns
Number flower per inflorescence	18 .23	20 .80*
Number of ovules per ovary	9 .98	0 .61 ns
Raceme number	6 .81	3 .80 ns
Legume number per raceme	5 .52	1 .02 ns
Seed number per raceme	13 .68	33 .75 ns

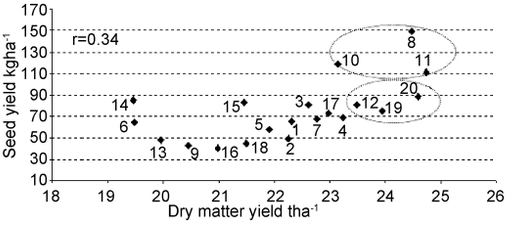

Figure 1 *Relationship between seed yield and dry matter yield .*

Conclusions Results confirm that landraces (8 , 11 and 10) of alfalfa are the best material for adaptation , forage and seed production , particularly in organic farming . Nevertheless good performances were shown by varieties (12 , 19 and 20) obtained from landraces , through broad phenotypic selection . Positive correlation coefficients of number of inflorescence per raceme and number of raceme per stem with seed yield indicate that these characteristics may be important criterion for selection . These results are similar to those of Falcinelli (1999) .

References

Falcinelli M . , 1999 . *Journal of New Seed* , 1 , 37-66 .
Willer H . and Yussefi M . 2006 . Statistics and Emerging Trends 2006 . *IFOAM . Bonn Germany* .