

INTRODUCTION TRIALS OF WINTER SPECIES IN SUBTROPICAL SUBHUMID ZONE AT PESHAWAR

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Summary, Six grass and six legume species were sown in November, 1977 under barani conditions at Peshawar (av. rainfall 350 mm) in eleven blocks. *Festuca arundinacea* (R.M. No. 70) produced maximum green and air-dried forage in April 1978. There was no significant difference of forage production amongst the *Medicago* spp. and *Vicia* spp. Forage production of grasses was significantly more as compared to *Medicago* spp. and *Vicia* spp. However, *Festuca arundinacea* (70), *Lolium perenne* (334) and *Lolium multiflorum* (191) did not show any significant difference in forage production amongst themselves.

Introduction. Peshawar, where the study was conducted is situated between 33°–40' and 34°–25' north latitude and 71°–15' and 72°–15' east longitude. The soil is clay loam in texture and is deficient in organic matter and nitrogen. Average annual rainfall is 350 mm and mean maximum and minimum temperature is 40.6°C in June and 4.4°C in January respectively. The rainfall and temperature averages for the study period are as under:

Month	Rainfall	Temperature C°	
	(mm)	Mean Max.	Mean Min.
November, 1977	22.35	27.1	11.6
December, 1977	5.33	21.0	6.5
January, 1978	9.14	17.5	2.7
February, 1978	14.73	19.5	5.7
March, 1978	207.52	20.5	8.7
April, 1978	20.06	30.0	15.2
May, 1978	—	39.4	21.1
June, 1978	9.65	41.6	26.7

The indigenous vegetation dries up during winter and there is a shortage of green forage in the area. To provide the green forage during winter to live-stock, the exotic species were sown at Peshawar to find out their adaptability/suitability under barani conditions.

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Method. The following 12 species/ecotypes were sown on November 16, 1977 in a randomised complete block design in eleven blocks. Sowing was done in 6x6 m² well prepared plots in 13 lines spaced at 50 centimetres with 50 centimetres border between the plots. Seed was sown at a depth of 1.5 cm. The following species/ecotypes were sown:

R.M. No.	Species	Source
70	<i>Festuca arundinacea</i>	F.A.O. — 14.030
191	<i>Lolium multiflorum</i>	F.A.O. — 14.186
205	<i>Lolium multiflorum</i>	Poland
306	<i>Lolium multiflorum</i>	Poland
79	<i>Lolium perenne</i>	F.A.O. — 14.074
334	<i>Lolium perenne</i>	Oregon
213	<i>Vicia sativa</i>	F.A.O. — 12.315
214	<i>Vicia sativa</i>	F.A.O. — 13.603
215	<i>Vicia dasycarpa</i>	F.A.O. — 13.007
449	<i>Medicago littoralis</i>	Australia
450	<i>Medicago truncatula</i>	Australia
451	<i>Medicago scutellata</i>	Australia

The species/ecotypes germinated in December, 1977. Phenological observations were recorded for all the species during every month after germination. Data for average height, average per cent cover, average number of plants and average forage production (green) were collected on April 27, 1978. Airdried weights of clipped forage were recorded on May, 10, 1978. The average forage production in Kg/ha was calculated for each species.

Analysis of variance was done to determine whether means of per cent over, No. of plants and forage production were significantly different from each other. Duncan's multiple range test was applied to evaluate the difference of means.

Results and Discussions. All the species were in flowering and fruiting stage at the time of final observations. *Vicia sativa*, *Medicago littoralis*, *Medicago truncatula* had poorly developed while *Lolium multiflorum*, *Lolium perenne*, *Festuca arundinacea*, *Medicago scutellata* and *Vicia dasycarpa* were in better condition and flush green.

Forage production. The forage production of grasses was significantly greater (at 5% level — Duncan's Multiple Range Test) than *Medicago* spp. and *Vicia* spp. There was no significant difference in the forage production amongst the grasses themselves. *Festuca arundinacea* (70) *Lolium multiflorum* (191) and *Lolium perenne* (334) outyielded all other species as indicated by the following figures.

(Forage production kg/ha — calculated (Airdry))

R.M. No	Species	Mean*	Significant difference
70	<i>Festuca arundinacea</i>	2630	
334	<i>Lolium perenne</i>	2458	
191	<i>Lolium multiflorum</i>	2155	
305	<i>Lolium multiflorum</i>	1834	
306	<i>Lolium multiflorum</i>	1676	
79	<i>Lolium perenne</i>	1293	
215	<i>Vicia dasycarpa</i>	1117	
451	<i>Medicago scutellata</i>	555	
214	<i>Vicia sativa</i>	368	
449	<i>Medicago littoralis</i>	303	
213	<i>Vicia sativa</i>	230	
450	<i>Medicago truncatula</i>	196	

*Means followed by the same vertical line are not significantly different from each other.

Establishment. The number of plants for each species was counted in each block. The number of plants established for *Festuca arundinacea*, *Lolium multiflorum* and *Medicago scutellata*, *Lolium perenne* were significantly more (at 5% Duncan's multiple range test) when compared with *Vicia sativa*, *Vicia dasycarpa*, *Medicago truncatula* and *Medicago littoralis*. The average number of plants for each species is as under:

No. of plants established per plot 6x6 m²

R.M. No.	No. of Plants	Means *
70	<i>Festuca arundinacea</i>	810 ^a
306	<i>Lolium multiflorum</i>	764 ^a
305	<i>Lolium multiflorum</i>	754 ^a
334	<i>Lolium multiflorum</i>	720 ^a
191	<i>Lolium multiflorum</i>	706 ^a
79	<i>Lolium perenne</i>	301 ^b
451	<i>Medicago scutellata</i>	301 ^b
215	<i>Vicia dasycarpa</i>	237 ^b
449	<i>Medicago littoralis</i>	226 ^b
450	<i>Medicago truncatula</i>	171 ^b
214	<i>Vicia sativa</i>	132 ^b
213	<i>Vicia sativa</i>	93 ^b

*Means followed by the same letter are not significantly different from each other.

Percent cover. The per cent cover of *Festuca arundinacea*, *Lolium multiflorum*, *Lolium perenne*, *Vicia dasycarpa* and *Medicago scutellata* was significantly more (5% Duncan's multiple range test) as compared with *Medicago littoralis*, *Medicago truncatula* and *Vicia sativa*. There was no significant difference of per cent cover amongst the grasses themselves. The average figures for per cent cover recorded for each species are as under:

Per cent cover (per plot 6x6 m²)

R.M. No.	Specie	Mean*
191	<i>Lolium multiflorum</i>	43 ^a
70	<i>Festuca arundinacea</i>	41 ^a
334	<i>Lolium perenne</i>	40 ^a
79	<i>Lolium perenne</i>	32 ^{ab}
306	<i>Lolium multiflorum</i>	32 ^{ab}
305	<i>Lolium multiflorum</i>	32 ^{ab}
215	<i>Vicia dasycarpa</i>	30 ^{ab}
451	<i>Medicago scutellata</i>	26 ^b
214	<i>Vicia sativa</i>	13 ^c
450	<i>Medicago truncatula</i>	13 ^c
449	<i>Medicago littoralis</i>	10 ^c
213	<i>Vicia sativa</i>	7 ^c

*Means followed by the same letters are not significantly different from each other.

Conclusion. According to preliminary results *Festuca arundinacea* (70), *Lolium multiflorum* (191) and *Lolium perenne* (334) showed better performance and outyielded all other species under trial. *Vicia dasycarpa* and *Medicago scutellata* were the second best performers amongst legumes in this study.