SUMMARY

This experiment was conducted at El-Qasr area in Matruh during two growing seasons of 1991/92 and 1992/93. The soil is calcareous in nature of pH 8.0 - 8.5.

The study included sixteen treatments which were the combination of 4 population densities of Medicago arborea (100, 200, 300 and 400 shrubs/feddan) within the acacia shrubs (200 shrubs/feddan); 2 herbaceous fodder crops (Barly and Vicia) were interplanted at the interspaces of acacia and arborea shrubs, and 2 fertiliztion treatments of a mixture from 300 kg calcium superphosphate (15.5 P_2O_5) + 500 Kg mineral sulphur per/feddan and the control.

Experimental design was split-split plot, with three replications. The population densities of *Medicago arborea* were randomly arranged in main plot, the 2 herbaceous crops (Barley and Vicia) were assigned randomly in the sub-plots, and fertilization treatments were located in the sub-sub plots.

The main results could be summarized as follows :

Acacia Saligna :

1. Fresh and dry fodder yields of acacia were significantly decreased as the population densities of the interplanted M. arboria increased from 100 up to 400 shrubs/feddan. The highest fresh (215 kg/feddan) and dry (71 kg/fedan) fodder yields of acacia shrubs, were obtained when the population density of

the interplanted *M. arboria* was 100 shrubs/feddan. Whereas, the lowest fresh (154 kg/feddan) and dry (55kg/feddan) fodder yield of acasia were obtained at the densest population (400 shrubs/feddan).

2. Number of branches per acacia shrubs and its crown volume were significantly increased in value as the number of the interplanted *M. arborea* shrubs increased from 100, 200, 300 and up to 400 shrubs/ feddan.

3. Height of shrubs of acacia was not significantly affected by the applied population densities of the interplanted M. *arborea* shrubs. However, its stem diameter decreased but did not reach the level of significance.

Fresh and dry fodder yields of acacia were significantly higher when the interplanted herbaceous crop was vicia rather than barley. The obtained fresh fodder yield of acacia was 206 kg/feddan when the interplanted herbaceous crop was vicia compared to 160 kg/feddan where the interplanted crop was barley. The respective dry yield was 66 and 58 kg/feddan. A reduction of 29 and 14% for fresh and dry yield were obtained, respectively.

5. Number of branches of acacia shrubs and stem diameter were slightly but significantly increased when the interplanted herbaceous crop was vicia and not barley.

6. Height of plants and crown volume of acacia shrubs were not significantly affected by the different interplanted herbaceous species.

7 Fertilization treatment of phosphorus + sulphur (300 kg calcium super phosphate : 15.5% P2O5 + 500 kg mineral sulphur /feddan) caused a significant increase in fresh fodder

yield of acacia shrubs (216 kg/feddan) as compared with the control (150 kg/feddan) with 44% increase. A similar behaviour was obtained for dry yield which was 73 kg/feddan for the fertilized shrubs compared with 51 kg/feddan for the control with 43% difference..

8. Height, number of branches per acacia shrub as well as its stem diameter and crown volume were significantly higher for the fertilized shrubs compared to the control. The respective values were 79 cm, 5.5 branches, 1.7 cm, and 9.7 m^3 for the fertilized shurbs compared to 6.4 cm, 4 branches, 1.3 cm and 5.8 m^3 for the infertilized ones.

The interplanted *Medicago arborea* shrubs:

9. Fresh and dry fodder yields of the interplanted M. arborea were continuously and significantly increased as the number of the shrubs increased. As the interplanted *M. arborea* shrubs increased from 100, 200, 300 and up to 400 shrubs/feddan, fresh yield was 34.7, 54.7, 65.0, and 76.7 kg/feddan. The respective dry yield was 9.1, 15.0, 18.9 and 22.8 kg/feddan.

10. Crown volume of the interplanted *M. arborea* shrubs was significantly increased with the increase in its population density per unit area of land. However, height of plants and number of branches/shrub were not significantly affected by the applied population densities of the interplanted *M. arborea* shrubs.

11. Fresh and dry fodder yields of the interplanted *M. arborea* shrubs were significantly higher when the interplanted herbaceous crop was vicia compared with barley.

12. Number of branches per shrub of *M. arborea* and its crown volume were significantly higher when the interplanted herbaceous crop was vicia rather than barley with no significant difference for the height of M. arborea shrubs.

13. The application of phosphaorus + sulphur fertilization treatment produced the highest fresh and dry fodder yield of the interplanted *M. arborea* shrubs. The obtained fresh and dry yield was 71.2 and 20.5 kg/feddan respectively for the fertilized treatments being 44.3 and 12.0 kg /feddan for the dry fodder yield.

14. Height, number of branches per shrub and crown volume of M. arborea shrubs were significantly higher for the fertilized treatment as compared with the control.

The interplanted herbaceous fodder crops:

Barley :

15. Increasing population densities of the interplanted M. arborea shrubs from 100 to 400 shrubs/feddan caused significant increase in fresh fodder yield of the interplanted barley from 2.30 to 3.27 ton/feddan. This result was not true for the dry yield since the difference was not significant.

16. Neither height of plants nor the number of tillers/sq. meter of the interplanted barley were affected by the applied population densities of the interplanted *M. arborea* shrubs.
17. Fresh and dry fodder yield of the interplanted herbaceous crop barley were significantly increased by the applied phosphorus + sulphur fertilization treatment as compared with the control. Fresh fodder yield was 3.03 vrs 2.50, and the dry yield was 0.75 vrs 0.56 ton/feddan for the fertilizer treatment vrs the control, respectively.
18. Height of plants and number of tillers/sq meter of barley were significantly increased by the applied fertilization treatment as compared with the control.

Vida

19. Fresh fodder yield of the interplanted vicia was very much low compared to barley.
20. As the number of the interplanted *M. arborea* fodder shrubs increased from 100 to 400 shrubs/feddan, fresh yield of the interplanted herbaceous crop vicia was doubled with significant difference. This was not the case for dry fodder yield, where the difference did not reach the level of significance.
21. Height of vicia plants and the number of branches/plant were not significantly affected by increasing population densities of the interplanted *M. arborea* shrubs from 100 up to 400 shrubs/feddan.
22. Fresh and dry fodder yields of the interplanted herbecious crop vicia were significantly higher for the applied phosphorus + sulphur fertilization treatment compared with the control.

23. Height of the interplanted vicia plants and its number of branches/sq meter were significantly higher for the fertilized treatment as compared with the unfertilized one.
24. In comparing fresh and dry fodder yield of the two interplanted herbaceous crops, it was obviously clear that barley was of great superiority in production than vicia when interplanted with *M. arborea* and acacia shrubs .
25. Fresh and dry fodder yield of barley was 3.77 and 0.66 tons/feddan, respectively, being 0.66 and 0.11 tons/feddan for vicia. In other words, barley produced fresh and dry fodder yield of 5 folds higher as compared with vicia when interplanted with *M. arborea* and acacia shrubs.
26. Heights of the interplanted barley plants (41.8 cm) were significantly much taller than those of vicia (15.7) due to their different nature of growth.
27. The interaction effect of the applied population densities of the interplanted *M. arborea* shrubs x the interplanted herbaceous fodder species x the applied phosphorus + sulphur fertilization treatment on its fresh and dry fodder yield was significant, So, the highest fresh and dry fodder yields of acacia were produced when acacia was interplanted with the highest population density of *M. arborea* shrubs (400/feddan) and the interspaces were interplanted with the herbaceous fodder crop barley where the whole plantation was fertilized with phosphorus + sulphur treatment. Such interaction effect of the above factors was significant.
28. The interaction effect of the above three factors had also significant effects on the height of acacia plants, and its crown volume.

29. The highest fresh and dry yields of *M. arborea* were obtained when the interplanted herbaceous fodder crop was barley and the whole plantation was fertilized with phosphorous+ sulphur treatment. The same interaction had a significant effect on fresh and dry yield of the interplanted herbaceous fodder crops.

30. Chemical constituents and the total digestable nutrients (TDN) of the grown fodder components of the proposed agroforestry plantations as affected by the interplanted population densities of M. arborea could be summarized as follows :

M. arborea Shrubs/feddan	P	CH2O	CP	CF	EE	TDN
			(%)			
Acacia saligna						
100	0.16	13.6	18.4	21	3.9	43
200	0.13	15.6	18.3	22	3.1	42
300	0.12	18.9	17.2	23	3.0	42
400	0.11	21.5	17.1	25	2.7	42
L.S.D. at 5%	0.01	1.4	0.4	N.S.	N.S.	N.S.
Medicago arborea						
100	0.16	31	18.1	13	3.5	45
200	0.14	32	17.9	17	3.3	48
300	0.13	34	17.2	18	3.0	48
400	0.12	37	16.3	19	2.2	48
L.S.D. at 5%	0.01	1.4	N.S.	1.3	N.S.	1.9
Barley *(Hordium vulgare)*						
100	0.16	34.9	17.8	22.4	5.4	57
200	0.15	36.0	13.6	24.2	6.2	57
300	0.12	37.5	13.4	25.0	6.2	58
400	0.11	38.7	14.0	25.9	7.0	61
L.S.D. at 5%	0.02	1.3	N.S.	1.0	N.S.	1.3
Vicia *(Vicia monatha)*						
200	0.12	20.3	21.3	17.2	6.2	51
400	0.11	22.5	18.2	17.8	6.1	48
600	0.10	28.5	16.8	18.8	6.4	52
800	0.08	33.8	20.5	19.9	7.4	60
L.S.D. at 5%	0.02	1.3	N.S.	1.0	N.S.	1.3

31. Chemical constituents and the total digestable nutrient (TDN) of the interplanted herbaceous fodder crops as affected by the proposed agroforestry plantations systems could be summarized as follows :

M. arborea Shrubs/feddan	P	CH2O	CP	CF	EE	TDN
			(%)			
with Acacia saligna						
Barley	0.15	19.1	16.6	24	3.3	43
Vicia	0.11	15.6	18.8	22	3.1	41
L.S.D. at 5%	0.02	1.4	5.4	1.7	N.S.	N.S.
with Medicago arborea						
Barley	0.14	35	17.6	18	2.9	48
Vicia	0.13	32	17.0	15	3.0	47
L.S.D. at 5%	0.01	0.9	N.S.	1.1	N.S.	N.S.

32. Chemical constituents and the total digestable nutrient (TDN) for the components of the grown agroforestry plantations as affected by the applied phosphorus + sulphur fertilization treatment are summarized as follows :

M. arborea Shrubs/feddan	P	CH2O	CP	CF	EE	TDN
			(%)			
Acacia saligna						
Control	0.11	15.9	16.1	24	3.0	41
Fertilizaed	0.15	18.8	19.3	21	3.4	44
L.S.D. at 5%	0.01	1.0	0.3	0.8	N.S.	0.8
Medicago arborea						
Control	0.12	30	16	18	2.9	45
Fertilized	0.15	36	18.6	15	3.1	50
L.S.D. at 5%	0.01	1.4	0.6	0.9	N.S.	0.9
Barley *(Hordium vulgare)*						
Control	0.12	38.2	13.4	26.5	5.9	57
Fertilized	0.15	35.5	15.9	22.2	6.6	58
L.S.D. at 5%	0.01	0.7	1.0	0.5	N.S.	0.6
Vicia *(Vicia monatha)*						
Control	0.09	27.4	17.3	19.8	5.8	52
Fertilized	0.11	25.1	21.0	17.0	7.3	53
L.S.D. at 5%	0.01	0.7	1.0	0.5	N.S.	0.6

33. Total fresh and dry fodder yield per feddan were estimated and recorded from the added up of the productivity of each component of the proposed agroforestery plantation Acacia + *M. arborea* at the different population densities + Barley or Vicia). properly fertilized with phosphorus + sulphur. This parameter is of great importance in evaluating the total productivity per unit area of land for the different agroforestery plantation systems.

34. The applied agroforestry plantation systems may be of great value for selecting the best fit one regarding the requisted fodder yield and quality.

35. Proposed agroforestry plantation systems seems to be economically viable, socially accepted, environmentally feasable, and matches with the consept for sustainable desert development.