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Seed Potentialities Of Medics In Subhumid Zone With A View To Use Them In Steppe Zone

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ABSTRACT: In Algeria, about 1/5 of the total area is in semi-arid bioclimatic stage. It usually presents vegetation with weak Zoo-technique interest Transformation of these fallows by leguminous vegetables with self-regenerative power as Medics will allow regenerating grass-lands and formation of arable stratum into these grounds. According to our results that would increase weight of pods in species with large grains (*M.ciliaris)* as population S3 which possesses the higher weight of the pods (2192,00g/m²) and seeds (591,558g/m²) would be : average width of ramifications S3(53,083cm) not far of C2 (59,756cm) ; number of stems per square metre, S3 (996,66) not far of C2 (1166,66) and quantity of S3 dry material (451.95 g / m²) not far to C2 (574.25 g / m²).Likewise for the second specie with large grain *M.intertexta.* For species with small grains (*M.truncatula*) it is not population which has higher weight in pods that possesses higher weight in seed since population which has greater number of stems by square metre (Tr55 :1128,33) is classed in second position for seeds production of green material and so for width of ramifications, and third in production of dry material. The first analysis plan of main components has developed us three groups of populations:(Tr334,Tr27, Tr55,Tr407, Tr221, Poly27, Tr238); (C2,C52,C59 ,S3,S5,C204) et(I31,I11,I756,I407,107,Poly205). The introduced Aus 106 population takes position between the two first groups. The second factorial axis, the same population groups have been formed except that Aus 106 is in group of *M.ciliari* Which allows a mixing in population sowing with large and small grains and so population with small grains between them. This will give best ecological balance and best nutritious value at the same time. *M.ciliaris* which forms apart group can be mixed with the introduced population *M.muricoleptis*.
Keys Words: Populations, Medics, Pods, Seeds, Fodder Leguminous.

INTRODUCTION

The total area of 1/5 is taken place in semi-arid bioclimatic stage. This type of ground with steppe not much productive and presenting vegetation more often in small zoo technique interest. Furthermore, this ground is submitted to erosion phenomena favoured by over-pasture and by mediocre vegetable cover. Transformation of these fallows by leguminous plants with self-regenerative power, in a system of cereal crop rotation / annual Medocago becomes priorities to occupy this vast area. Trials of Ley Farming System led from 1972 to 1978 although conclusive were not been pursued (Abdelgherfi and Abdelguefi – Barrekia, 1987). According to Heyn (1963), annual species are particularly quartered in Mediterranean region. Their distribution is discriminated by recording rain-gauge and to smallest level by altitude and by ground texture (Hassen et al 1996). A lot of constraints prevent extension of annual locale Medicago or introduced in Algeria. However, we had been interested to yield of pods and to seed production of about twenty populations belonging to species: *M.intertexta , M.ciliaris, M.polymorpha , M.Truncatula* and an introduced population belonging to *M.muricoleptis* in order to see natural seed potentialities of these species. At this juncture, we tried to approach determinant parameters of this production which are:
(i) green and dry material (ii) width of ramifications (iii) weight of 50 pods and weight of their seed (iiii) and number of stems by square metre. Those data are thus very interesting because during dry period, from June to October, pods constitute available food for animals.

MATERIAL AND METHODS

Trial is performed on 13 December 2012 at experimental farm of National Upper School of Agronomy situated in capital which itself is in North of Africa. This station is at 30°8' longitude and 36°43' north and altitude of 48 m. Previous cultivation was maize..Then, trial is a whole random bloc with three repeating. In each bloc, we have 20 populations represented each one by four lines of one metre spaced out of 60 cm with 80 grains by population and by line. Each bloc is spaced to each other by 1.50m. Physical and chemical analysis of sampling harvested on this ground before to sow at 20cm and 4Ocm depth has given a muddy texture (grounds triangle) and richer in calcium and poor in nitrogen of organic materials, of potassium and of sodium (Analysis performed in Departments : Science of the Ground of ENSA on 2012 / 2013). Climatic conditions of the experimental period give the higher monthly temperature in May, with average of 17,8c° with maximum of 23°c. The coldest month is February with average of 11.5°c. The coldest day records 5.9°c. Then, the humid month is January with average of 83.9 mm. The most important precipitations recorded is 137 mm in space of three days (Station of agro-meteorology of ENSA 2012 / 2013).Used vegetal material coming from collection of the school is shown in table 1.

Table 1. Code and origins of populations studied and so average weight of 1000 grains.

Species	Populations code	Weight of 1000 seeds	Origins
M.truncatula	Tr407 Tr238 Tr 334 Tr221 Tr55 Tr27 I756 I107 I4O7 I11 I31	3,58g	Algérie (2004)
M .intertexta	S3 C52 C2 C204 S5 C59	15,77g	Algérie(2004)
M.ciliaris	poly 27 Poly 205	13,21g	Algérie(2004)
M .polymorpha		3,24g	Algérie(2004)
M.muricoleptis	Aus106	6,26g	Turkie(2004)

Used software for statistical analyses are: Stat View and Statistica

RESULTS AND DISCUSSION

In 1977, at the level of Technique Development Institute of Large Culture, yield of pods obtained during the first trials was of one quintal (100 kg) by hectare with help of gatherer of pods. This yield is obtained in sub littoral zone between 100 and 200 m altitude and 1/3 of area in piedmont, between 400 and 600 m altitude with rainfall of 500 mm in average. This corresponds to 10g/m2, a value very lower to one we have found; since we have not made pasture and we have harvested with hand. So our values vary between 78,66g/m² at poly 27 and 3637,33g/m² at I107 (Table.2). It is noted that weight of 1000 grains of studied populations and subhumid climate, influence hugely on difference of obtained result. Moreover, yield in grains is in accordance of pods number by plant, of number of grains by pods and by weight of a grain. Number of pods by plant is correlated to yield by which it exists a wide variability; some genotypes present a better aptitude to fruit set. Nevertheless, heritability in the broadest sense of character is weak (0,565±0,1) (Le Sech and Huygh., 1991 ;Huyghe.,1989 in Galais and Bonnerot.,1992).

All parameters which we have studied are highly significant p<0, 0001 (Annex 1)

Correlation matrix for a. ddl=19 (Annex2) and α= 0,05 son r theoretical =0,4329 and for α=0,01 son r theoretical = 0,5487 and at last for α=0,001 r theoretical =0,6652. So r calculated in matrix is upper to theoretical r for α=0,001, thus, very highly upper Criterion of Kaiser (Annex 3): leads us to retain 2 axes and in criterion of crank it is observed an important fall from the first axis (from 78,73% to 12,43% of inertia). In first plan (Annex 4) all parameters are near of the circle thus, are effectively well linked with the two factors constituting this plan (F1 and F2). The first factorial axis gives (78,73%+12,43%=91,16**%),** Axis about it is preserved by projection of maximum initial scattering of cloud points. All variables occupy a zone enough restricted in side of correlations circle. Maximum angle between two variables is fewer to 90. This suggests that all variables are positively in correlation between them (Annex 2). Parameters MS (g/m_2), widths of stems confront others parameters but are grouped. In the other hand, number of stems parameter by m^2 is distant of these predecessors. This plan has formed us three groups of populations: Tr27, Tr55, Tr407, Tr221, Poly27, Tr238) ; (C2, C52, C59, S3, S5, C204) ; (I31, I11, I756, I407, I107, Poly205)..

The population Aus 106 introduced takes place between the two first groups. The second factorial axis (Annex 5) adds small information compared to first one, the stem number parameter by m2 is getting closer of the rest and angle formed between each two parameters is nearly the same. Same groups of populations are formed except Aus 106 which is in group of *M.ciliaris.* Is seems that two characters are sensitive to improve genetically yield stability; It is question first of all of increase of the grain size. On the other hand, this might allow a better transfer of dry material and eventually to compensate weak number of pods. In other respects big grains give vigorous seedlings able of a best installation, notably of their root system. These seedlings are then

less sensitive to stress (Galais and Bonnerot., 1992).This is case of *M.ciliaris* and *M.intertexta* species with big grains.

CONCLUSION

All studied parameters are highly correlated, have direct impact on pods production and seed quantity. However, we need to take in account of 1000 grains' weight to distinguish big grains from the small ones to judge at last obtained yield. In the other side, this obtained yield in an experimental plot without any pasture or farm equipment, loss rate is negligible. Studied populations coming from different bioclimatic stages from 1974 are probably acclimatized to subhumid climate had given this high yield. Their rusticity and hardiness are always making a gene tank for selectors. As extension perspectives Medics seem to be well adapted to littoral zones or sub-littoral of lower altitude at 600/700 m. In steppe zone, we should give more support on known populations in the meanwhile to dispose trials results of this material at level of those regions where our colleague is working. In group of M.intertxta which have a weight of 1000 grains, the higher is found in population of small grains poly205 and other population of M.polymorpha classed with M.truncatula with weight of 1000 grains is closer. This allows mixing in population seedling to large and small grains and population to small grains between them. This will give a best ecologic balance and better nutritional value at the same time. M.ciliaris forming apart group can be mixed with introduced population M.muricoleptis . In conclusion to master seeds production of annual Lucerne (Medics) a number of issues may constitute barriers should be overcome. As we already saw it, seedling, maintenance and exploitation of cultivation by pasture, are decisive on results of pods' harvesting. This is particularly delicate and requests an appropriate material.

However length of ramifications and notably their leaves number seem to be important.That's just plants bearing ramifications with much leaves are able to develop quickly an important dry material and to allow a good fruit set whatever conditions of populating (Welcker and Huyghe., 1990 in Galais and Bonnerot., 1992). This put in highlight presence of genotype interactions of some morphological parameters such as width of ramifications and quantity of dry material produced by populations where correlation reaches 0,920***.Width of ramifications and so seed of 50 pods have correlation of 0,864*** (annex 2). Likewise, correlation between stems number by square meter and quantity of seed by square meter has correlation coefficient reaching 0,979*** (annexe 2). According to correlation results of these parameters, increase of pods' weight in species with big grains is evident. For instance, notably with M.ciliaris in S3 population having the higher weight of pods (2192,00g/m²) and in seed (591,558g/m²). In this same specie others parameters class in first position some populations compared with others: average width of ramifications S3 (53,083cm) not far of C2 (59,756cm) : Stems number by square meter S3 (996,66) not far of C2 (1166,66) and the quantity of dry material S3(451,95g/m²) not far ofC2 (574,25g/m²).Same thing for the second specie with big grain M.intertexta where all parameters: width of ramifications, number of stems by square meter, quantity of dry material would increase production of pods and seed of populations particularly in i107 which is classed the first except for dry material where it is classed in fourth and for width of ramifications where it is classed second Relating to species with small grains as M.truncatula it is not population which possesses higher weight in pods which may possess higher weight in seed. Pods have various shapes. Parameter of number stems production by square meter classes in first position population (Tr55:1128,33) and this same population is classed in second position for seed production, green material and so for width of ramifications. On the other hand in third position for populations for dry material production .

Test of Newman and Keuls had led us towards homogeneous groups mentioned in Table 2. The three populations composing only one homogeneous group for pods production parameter in gram by square meter are by increasing order I107 (3637g /m²), Tr221 (90,67g/m²) et poly27 (78,66g/m²).For M.intertexta I107 that's the highest value among all studied populations. Then, the weakest of these same populations it is M.Polymorpha 27 (78,66g/m²). Value of M.truncatula 221 is the weakeramong M.trunacatula.

Seed production in gram by square meter M.intertexta 107 constitutes homogeneous group with the highest value of studied population (900,375g/m²). Weakest values of M .polymorpha and M.truncatula constitute another homogeneous group (Tr334 (60,374 g /m²), Tr221 (26,366 poly27 (21,533g/m²). g/m²),

Table 2. Average by seed population and parameters which influence this production and groups formed by Newman and Keuls Test.

Populations	Pods G/m²	Seed of 50 Pods en g	Seed g/m²	MV g/m²	MS g/m²	L (cm)	Nomber of stems /m²
C52	1358,222 ABC	2,170 ABC	238,319 AB	3350 ABCD	446,7 ABCDE	40,34 BCDEF	1165 AB
C204	1808,000 ABCD	2,857 BC	359,232 ABC	3670 ABCD	567,9 ABCDE	49,89 CDEF	746,666 AB
S5	1672,888 ABCD	2,919 BC	297,769 AB	2926,666 ABCD	401,116 ABCDE	43,93 BCDEF	950 AB
C2	1061,333 ABC	2,752 BC	194,744 AB	5056,666 BCD	574,25 ABCDE	59,756 EF	1166,666 AB
S3	2192,000 ABCD	3,851 CD	591,558 ABC	3233,333 ABCD	451,95 ABCDE	53,083 DEF	996,666 AB
C58	1360,000 ABC	3,926 CD	445,993 ABC	3050 ABCD	367,333 ABCD	35,94 ABCDE	1125 AB
Aus106	944,000 AB	1,599 AB	359,077 ABC	3626,666 ABCD	534,566 ABCDE	41,201 BCDEF	1300 AB
Tr334	476,000 AB	0,542 A	60,374 A	2123,333 ABC	469,40 ABCDE	22,833 AB	1610 B
Tr55	881,778 ABC	0,711 A	206,173 AB	1500 AB	204,84 ABC	29,23 ABCD	1128,33 AB
Tr238	327,111 AB	0,788 A	217,885 AB	1392,083 AB	41,266 A	10,533 A	410 A
Tr407	515,556 AB	0,405 A	107,687 AB	2015 ABC	227,23 ABC	17,5 AB	870 AB
Tr27	1057,778 ABC	0,736 A	185,918 AB	1674,20 AB	247,166 ABC	32,11 ABCD	1340 AB
Tr221	90,667 A	0,424 A	26,366 A	1852,5 AB	216,778 ABC	21,066 AB	580 AB
I11	2428,444 BCD	4,808 D	495,152 ABC	6593,333 D	622,283 BCDE	50,513 CDEF	1036,666 AB
I756	3000,888 CD	5,252 D	727,119 BC	4920 BCD	706,666 CDE	60,693 EF	958,333 AB
I107	3637,333 D	5,474 D	900,375 C	6630 D	610,566 ABCDE	54,146 DEF	1116,666 AB
I253	2849,777 CD	5,540 D	620,635 ABC	6545 D	849,766 DE	63,706 F	1030 AB
I31	1946,666 ABCD	3,811 CD	403,041 ABC	5826,666 CD	798,383 DE	50,233 CDEF	1268,333 AB
I52	2810,666 CD	4,877 D	563,102 ABC	6730 D	920,433 E	62,016 EF	975 AB
Poly205	2535,704 AB	4,742 A	528,926 A	6367,222 A	856,194 AB	58,652 A	1091,111 A
Poly27	78,666 A	0,2615 A	21,533 A	203,598 A	148,9 ABC	26,25 ABC	433,333 A

Annex 1. Analyse of used parameters variance

Analyse univariée Variance théorique = 1

	Variance	DDL	Chi 2	p	95% Inf.	95% Sup.
gousses g/m²	1425835,933	62	88401827,856	<,0001	1086270,891	1969341,742
les 50gousses g	73,001	58	4234,035	<,0001	55,147	102,045
semence des 50gs	3,911	59	230,746	<,0001	2,961	5,450
semence g/m²	86522,662	57	4931791,727	<,0001	65214,854	121335,430
MVg/m²	5544048,477	61	338186957,124	<,0001	4215107,995	7679456,918
MSg/m²	84496,321	62	5238771,927	<,0001	64373,391	116704,965
langueur (cm)	331,781	61	20238,643	<,0001	252,251	459,574
tiges /m²	162938,031	62	10102157,937	<,0001	124134,086	225047,398

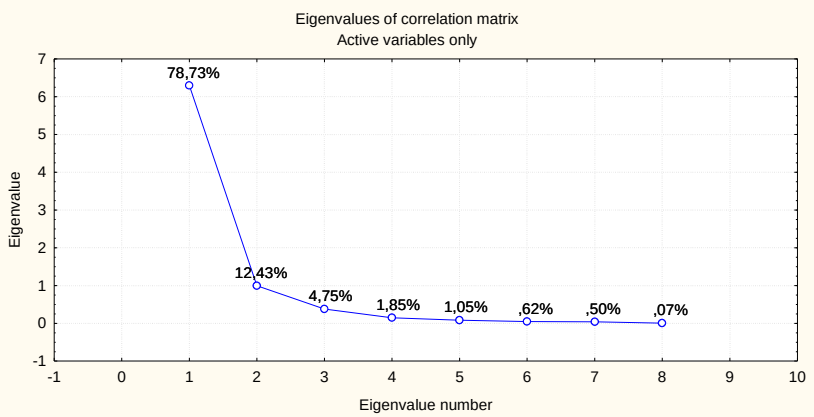
Annex 2 . correlation matrix of average values of 20 medics population

	Pods g/m²	50 pods s en g	Seed de 50gousses	Seed g/m²	MV g/m²	MS g/m²	Width (cm)	Stemm s g/m²
pods g/m²	1							
50pods s en g	0,987***	1						
Seed of 50 pods	0,913***	0,927***	1					
Seed e g/m²	0,930***	0,949***	0,962***	1				
MV g/m²	0,956***	0,951***	0,828***	0,919***	1			
MS g/m²	0,837***	0,865***	0,925***	0,898***	0,782***	1		
Width r (cm)	0,750***	0,801***	0,864***	0,828***	0,685***	0,920***	1	
Stem g/m²	0,810***	0,856***	0,891***	0,979***	0,763***	0,859***	0,885***	1

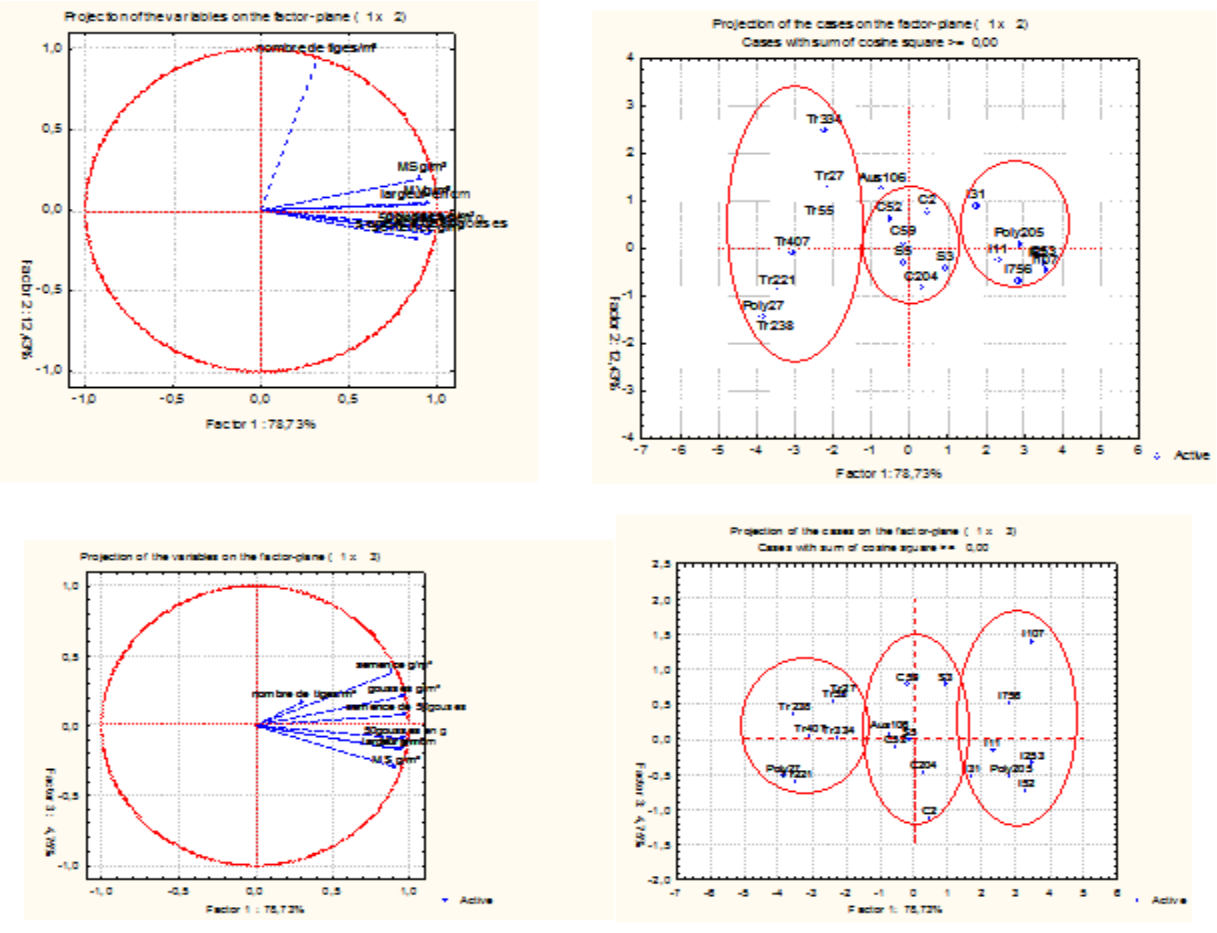
ddl =19 .α= 0,05 rth=0,4329 et α=0,01 r th= 0,5487 et enfin α=0,001 rth=0,6652. *** Very highly significant.

Annex 3. proper value (correlation matrix) Alone active variables

Value number	Eigenvalues of correlation matrix, and related statistics (S Active variables only			
	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	6,298628	78,73285	6,298628	78,7328
2	0,994203	12,42754	7,292831	91,1604
3	0,379923	4,74904	7,672754	95,9094
4	0,147696	1,84620	7,820450	97,7556
5	0,083840	1,04800	7,904290	98,8036
6	0,049634	0,62042	7,953924	99,4240



Annex 4. Analysis of main components of studied medics – plan 1



Annex 5. Analysis of main components of studied medics

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