

Article

Evaluation and Structuring of Agrodiversity in Oases Agroecosystems of Southern Morocco

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Supplementary Material

Table S1. Crops and varieties recorded in the oases studied.

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
Cereals								
Soft wheat (22,67)	<i>Not specified</i>	V1	+	+	-	-	-	+
	<i>Achtar</i>	V4	+	+	-	-	-	+
	<i>Nesma</i>	V9	+	+	-	-	-	-
	<i>Azouga</i>	V14	-	-	-	-	+	-
	<i>Tagoraret</i>	V15	-	-	-	-	-	+
Durum wheat (36,83)	<i>Aghzzaf</i>	V2	-	-	-	+	-	-
	<i>Aberyouun</i>	V3	+	-	-	-	-	-
	<i>Aksad</i>	V5	+	-	-	-	-	-
	<i>Karim</i>	V6	+	-	-	-	-	+
	<i>Korite</i>	V7	+	-	+	-	-	-
	<i>Merzouka</i>	V8	+	-	-	-	-	-
	<i>Zarban</i>	V10	+	-	-	+	-	-
	<i>Tafilalet</i>	V11	-	-	-	-	-	+
	<i>Tizekerte</i>	V12	-	-	-	-	-	+
	<i>Ouchen</i>	V13	-	-	-	-	+	+
Barley (55,33)	<i>Beldi</i>	V16	+	+	+	+	+	+
	<i>Algouz</i>	V17	-	-	-	-	+	+
	<i>Azermz</i>	V18	-	-	-	-	-	+
	<i>Bour</i>	V19	-	-	-	-	-	+

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
	<i>Amazigh</i>	V20	-	-	-	-	-	+
	<i>Lalten</i>	V21	-	-	-	-	-	+
	<i>Mderma</i>	V22	-	-	-	-	+	-
	<i>Not specified</i>	V23	-	-	-	-	+	-
Corn (54,5)	<i>Byed</i>	V24	+	+	+	+	+	+
	<i>Hmar</i>	V25	+	-	+	+	+	+
	<i>Araïchi</i>	V26	+	-	-	-	-	-
	<i>Rich</i>	V27	+	-	-	-	-	-
Sorghum (5,83)	-	V28	-	-	-	-	+	+
Millet (1)	-	V29	-	-	-	-	-	+
Pulses								
Fava Bean (54,83)	<i>Beyda</i>	V30	+	+	+	+	+	+
	<i>Ouarzazate</i>	V31	-	-	-	-	-	+
	<i>Kehla</i>	V32	+	-	+	-	+	+
Lens (5,67)	-	V33	+	+	-	-	-	+
Pea (12,5)	<i>Beldia</i>	V34	+	+	+	-	+	+
	<i>Romia</i>	V35	+	-	-	-	-	-
Chickpea (1,67)	-	V36	+	-	-	-	-	+
Bean (1,17)	-	V37	-	-	-	+	+	+
Vegetables								
Potato (10,33)	<i>Beyda</i>	V38	+	+	-	+	-	-
	<i>Hamra</i>	V39	+	-	-	+	+	+
Onion (38,17)	<i>Roumi</i>	V40	-	-	-	-	-	+
	<i>Beldi</i>	V41	+	+	+	+	+	+
Carrot (42,33)	<i>Sfar</i>	V42	-	-	-	-	+	+
	<i>Hmar</i>	V43	+	+	+	+	+	+
Tomato (12,83)	-	V44	+	+	+	+	+	+
Okra (19)	<i>Hamra</i>	V45	-	+	+	-	-	-
	<i>Mchawka</i>	V46	-	+	-	-	-	-
	<i>Ratba</i>	V47	+	+	+	-	-	-
Turnip (45)	<i>Elfajli</i>	V48	-	-	-	-	+	+
	<i>Tagherdayte</i>	V49	-	-	-	-	+	+
	<i>Mahfour</i>	V50	-	-	-	-	-	+
	<i>Romi</i>	V51	+	+	+	+	+	+
Pepper (4,33)	-	V52	+	+	-	+	-	-
Zucchini (17,33)	-	V54	+	+	+	+	+	+
Gourd (16,83)	<i>Mkerkba</i>	V55	+	+	+	+	+	+
	<i>Slaoui</i>	V56	+	+	+	-	-	-
Beet (9,83)	-	V57	+	+	-	-	+	+
Eggplant (20,67)	-	V58	+	+	+	+	+	+

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
Lettuce (2,33)	-	V59	+	-	+	-	-	-
Cucumber (1,67)	-	V60	+	-	+	-	-	-
Garlic (1,33)	-	V62	+	+	-	-	-	-
Cabbage (10,5)	-	V63	+	+	+	+	+	+
Watermelon (2.33)	-	V67	+	-	-	-	-	-
Melon (2,17)	-	V68	+	-	-	-	-	-
Parsley (19,5)	-	V69	-	+	+	+	+	+
Coriander (3,67)	-	V70	-	-	-	-	+	+
Mint (14,33)	-	V71	-	-	+	+	+	+
Seeds - Spices								
Chili pepper (15,17)	-	V53	+	-	+	+	+	+
Cumin (0,17)	-	V61	+	-	-	-	-	-
Peanut (0,17)	-	V64	+	-	-	-	-	-
Fenugreek (0,17)	-	V65	-	-	-	-	-	+
Sesame (0,33)	-	V66	+	-	-	-	-	-
Forages								
Alfalfa (92,33)	<i>Beldia</i>	V72	+	+	+	+	+	+
	<i>Australia</i>	V73	+	+	+	+	+	+
	<i>Saoudia</i>	V74	+	-	-	-	-	-
	<i>Canada</i>	V75	-	-	-	-	+	+
	<i>Demnate</i>	V76	-	-	-	-	+	-
	<i>Moapa</i>	V77	-	-	-	-	-	+
	<i>American</i>	V78	+	-	-	-	+	+
Forage Sorghum (10)	-	V79	+	-	+	-	+	+
Fruit trees								
Fig tree (42)	<i>Byed</i>	V80	+	+	+	+	+	+
	<i>Abachil</i>	V81	-	-	-	-	+	-
	<i>Tamalka</i>	V82	-	-	-	-	+	-
	<i>Bakour</i>	V83	-	-	-	-	+	+
	<i>Lghdania</i>	V84	-	-	-	-	+	+
	<i>Tagordante</i>	V85	-	-	-	-	+	-
	<i>Tafounaste</i>	V86	-	-	-	-	-	+
	<i>Iâisa</i>	V87	-	-	-	-	+	-
	<i>Espagnole</i>	V88	-	-	-	-	+	-
	<i>Bzoulte Lâawda</i>	V89	-	-	-	-	+	+
	<i>Kahla</i>	V90	-	-	-	-	+	+
	<i>Hmar</i>	V91	+	+	+	+	-	-
	<i>Khder</i>	V92	+	+	+	-	-	-
	<i>Ain lhejla</i>	V93	+	-	+	+	-	-
	<i>Lfokaâ</i>	V94	+	-	-	-	-	-

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
Pomegranate tree (36)	<i>Targuiyte</i>	V95	+	-	-	-	-	-
	<i>Beldi</i>	V96	+	+	-	+	+	+
	<i>Al âansri</i>	V97	-	-	+	-	-	-
	<i>Khrifi</i>	V98	-	-	+	-	-	-
	<i>Al-Hamed</i>	V99	-	-	+	-	+	+
	<i>Roudani</i>	V100	-	-	-	-	+	-
	<i>Elâadmi</i>	V101	-	-	-	-	+	-
	<i>Sefri</i>	V102	-	-	-	-	+	+
Apricot (13)	<i>Lozmechmach</i>	V103	-	-	-	-	+	-
	<i>Romi</i>	V104	-	-	-	-	+	+
	<i>Beldi</i>	V105	+	+	+	+	+	+
Grapevine (16,33)	<i>Bida</i>	V106	-	-	-	-	+	+
	<i>Kehla</i>	V107	-	-	-	-	+	+
	<i>Bzollâawd</i>	V108	-	-	-	-	-	+
	<i>Moska</i>	V109	-	-	-	-	-	+
	<i>Non précis</i>	V110	+	+	+	-	-	-
Orange tree (16,33)	<i>Zenboh</i>	V111	-	-	-	-	+	+
	<i>Nafile</i>	V112	+	+	+	-	+	+
Mandarin tree (2,5)	-	V113	-	-	-	-	+	+
Almond tree (14,83)	<i>Elhare</i>	V114	-	-	-	-	+	+
	<i>Lhlo</i>	V115	+	+	+	+	+	+
Apple tree(13)	<i>Beldi</i>	V116	+	-	+	+	+	+
	<i>Romi</i>	V117	-	-	-	+	-	-
	<i>Stark</i>	V118	-	-	-	+	-	-
	<i>Golden</i>	V119	-	-	-	+	-	-
	<i>Mchrat</i>	V120	-	-	-	+	-	-
	<i>Lgala</i>	V121	-	-	-	+	-	-
Olive tree (48,33)	<i>Beldi</i>	V122	+	-	+	+	+	+
	<i>Dahbia</i>	V123	-	-	-	-	+	-
	<i>Meknasia</i>	V124	-	-	-	-	+	-
	<i>Haouzia</i>	V125	-	-	-	-	+	-
Quince tree (14,17)	-	V126	+	-	+	+	+	+
Peach tree (6,67)	-	V127	-	-	+	+	+	-
Walnut (3,83)	-	V128	-	-	-	+	-	-
Prickly pear (1)	-	V129	-	-	-	+	-	-
Carob tree (3,17)	-	V130	-	-	-	-	+	+
Pear tree (1,17)	-	V131	-	-	-	-	+	+
Lemon tree (5,67)	<i>Beldi</i>	V132	-	-	-	-	+	+
	<i>Roumi</i>	V133	-	-	-	-	-	+
Date palm (73,33)	<i>Mejhoul</i>	V134	+	+	+	-	-	+

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
	<i>Boufegouss</i>	V135	+	+	+	-	+	+
	<i>Tahmoute</i>	V136	+	+	+	-	-	+
	<i>Sayer(Khelt)</i>	V137	+	+	+	-	+	+
	<i>Azizaw</i>	V138	+	-	-	-	-	-
	<i>Toungalte</i>	V139	+	-	-	-	-	-
	<i>Bouslikhene</i>	V140	+	-	+	-	-	-
	<i>Tazggaghte</i>	V141	+	+	-	-	-	-
	<i>Lferch</i>	V142	+	-	-	-	+	-
	<i>Jihl</i>	V143	-	+	-	-	+	+
	<i>Klane</i>	V144	-	+	-	-	-	+
	<i>Aglide</i>	V145	-	+	-	-	-	-
	<i>Bourar</i>	V146	-	+	-	-	-	+
	<i>Ahardane</i>	V147	-	+	-	-	-	-
	<i>Bousakri</i>	V148	-	+	-	-	+	+
	<i>Chatoui</i>	V149	-	+	-	-	-	-
	<i>Jaâferi</i>	V150	-	+	-	-	-	-
	<i>M'ket</i>	V151	-	+	-	-	-	+
	<i>Mallal</i>	V152	-	+	-	-	-	-
	<i>Akadousse</i>	V153	-	-	+	-	-	-
	<i>Bid Djaje</i>	V154	-	-	+	-	-	-
	<i>Rass Latmer (Rass la7mar)</i>	V155	-	-	+	-	-	-
	<i>Initfite</i>	V156	-	-	+	-	-	-
	<i>Bousserdoune (Tarzawa)</i>	V157	-	-	+	-	-	-
	<i>Maâjounne</i>	V158	-	-	+	-	-	-
	<i>Kerna</i>	V159	-	-	+	-	-	-
	<i>Kerchaou</i>	V160	-	-	+	-	-	-
	<i>Admou</i>	V161	-	-	+	-	-	-
	<i>Bellahzid</i>	V162	-	-	+	-	-	-
	<i>Ouhefssa</i>	V163	-	-	+	-	-	-
	<i>Ouâamrane</i>	V164	-	-	+	-	-	-
	<i>Bouwtoubne</i>	V165	-	-	-	-	+	+
	<i>Ist-Taghjijte</i>	V166	-	-	-	-	+	-
	<i>Tamoucha</i>	V167	-	-	-	-	+	+
	<i>Admam</i>	V168	-	-	-	-	+	+
	<i>Bouteffah</i>	V169	-	-	-	-	+	+
	<i>Taghanimte</i>	V170	-	-	-	-	+	+
	<i>Tahddadte</i>	V171	-	-	-	-	+	+
	<i>Bousouayer</i>	V172	-	-	-	-	-	+
	<i>Najda</i>	V173	-	-	-	-	-	+
	<i>Tabouâtirte</i>	V174	-	-	-	-	-	+

Crop (%)	Variety	Code	Alnif	Zagora	Aoufous	Rich	Guelmim	Tata
	<i>Amennan</i>	V175	-	-	-	-	-	+
	<i>Tiskerte</i>	V176	-	-	-	-	-	+
	<i>Boulkissane</i>	V177	-	-	-	-	-	+
	<i>M-Teglay</i>	V178	-	-	-	-	-	+
	<i>Saoudi</i>	V179	-	-	-	-	-	+
	<i>Boudi</i>	V180	-	-	-	-	-	+
	<i>Tighlo</i>	V181	-	-	-	-	-	+
	<i>Bimon</i>	V182	-	-	-	-	-	+
	<i>Boutouala</i>	V183	-	-	-	-	-	+

Table S2. Farm structure (M: private; C: collective; H: Habous; A: Other).

Oasis	Ksar (village)	Area (ha)	Number of plots	Area/plot (ha)	Ownership type (%)
Alnif	Ammar	1,8 (0,5-4)	3 (2-4)	0,66 (0,25-1,5)	100 M
	Tizi	0,7 (0,1-3)	3 (2-4)	0,5 (0,05-1)	100 M
	Alnif	2,1 (0,02-10)	3 (1-4)	1,4 (0,33-4)	100 M
	Achbarou	1,6 (0,015-3,5)	3 (1-5)	0,5 (0,004-1)	100 M
	Ait Zeggane	2,2 (0,25-7)	3 (2-4)	0,7 (0,08-1,75)	100 M
	Total	1,68 (0,18- 5,5)	3(1,6- 4,2)	0,75 (0,15- 1,85)	100 M
Zagora	Asrir N ilemchane	1,1 (0,02-2,5)	3 (1-4)	0,4 (0,02-2)	95 M + 5H
	Tansita	1,4 (0,15-3,5)	3 (1-4)	0,5 (0,15-1)	95 M + 5H
	Amazrou	1,3 (0,1-6)	3 (1-4)	0,62 (0,16-3)	95 M + 5H
	Sart	1,63 (0,1-3)	3 (1-4)	0,7 (0,1-1,5)	100 M
	Aghla Oudrar	1,5 (0,2-4)	3 (2-4)	0,5 (0,16-1,3)	100 M
	Total	1,4 (0,12- 3,8)	3 (1,2 - 4)	0,54 (0,12 - 1,8)	97 M + 3H
Aoufouss	Takhyamte	1,5 (0,25-3)	3 (2-4)	0,46 (0,06-1)	65 M + 35 C
	Rbite	1,7 (1-4)	3 (2-4)	0,5 (0,25-1)	70 M + 30 C
	Zrigate	1,4 (0,5-4)	3 (2-4)	0,4 (0,15-0,9)	65 M + 35 C
	Lamâarka	1,2 (0,5-2)	3 (2-4)	0,32 (0,1-0,5)	70 M + 30 C
	Zaouia Jdida	1,12 (0,5-2,5)	3 (1-4)	0,42 (0,16-0,9)	65 M + 35 C
	Total	1,4 (0,55 - 3,1)	3 (1,8- 4)	0,42 (0,15- 0,9)	67 M + 33 C
Rich	Ait Moussa Ouali	1,3 (0,5-3)	3 (2-4)	0,49 (0,16-1)	65 M + 35 C
	Zaouia Sidi Boukil	2,35 (1-4)	3 (2-4)	0,64 (0,33-1,3)	80 M + 20 C
	Balite	1,33 (0,5-2,5)	3 (2-4)	0,43 (0,16-0,83)	75 M + 25 C
	M'zizel	1,9 (1-4,5)	3 (2-4)	0,6 (0,5-1,125)	65 M + 35 C
	Tamagourte	1,6 (0,1-3)	3 (2-4)	0,53 (0,03-1)	75 M + 25C
	Total	1,7 (0,62 - 3,4)	3 (2 - 4)	0,54 (0,24 - 1,1)	72 M + 28 C
Guelmim	Tighmert	0,36 (0,1-0,8)	9,81 (4-16)	0,03 (0,02-0,06)	85 M
	Ifrane	0,64 (0,05-3,5)	10,58 (3-40)	0,04 (0,01-0,1)	89 M + 11 A

Oasis	Ksar (village)	Area (ha)	Number of plots	Area/plot (ha)	Ownership type (%)
	Fask	1 (0,05-6)	1,8 (1-5)	0,58 (0,05-5)	100 M
	Tagante	0,46 (0,05-2,5)	5,32 (1-15)	0,2 (0,01-2)	100 M
	Taghjijt	0,18 (0,04-0,5)	5,11 (3-11)	0,03 (0,01-0,15)	90 M
	Total	0,52 (0,04-6)	6,52 (1-40)	0,17 (0,01-5)	92,8 M + 2,2A
	Tissint	0,2 (0,1-0,6)	6,85 (3-17)	0,035 (0,015-0,1)	95 M + 10 A
Tata	Akka	0,22 (0,1-0,5)	8,2 (2-20)	0,033 (0,02-0,1)	90 M
	Ait Oubelli	0,28 (0,06-1,5)	5,6 (1-13)	0,05 (0,02-0,4)	85 M
	Foum Zguid	0,26 (0,1-0,7)	6,7 (2-15)	0,04 (0,01-0,075)	95 M
	Foum Lahcen	0,35 (0,1-1,5)	9,1 (3-25)	0,05 (0,02-0,3)	95 M
	Total	0,26 (0,06-1,5)	7,29 (1-25)	0,04 (0,01-0,4)	92 M + 2 A

Table S3. Agricultural practices (An: Animal; Tr: Tractor; Ch: Plough; Ti: Three-wheeler; Ca: Truck; T: Traditional; Me: Mechanical; K: Khettaras; S: Seguia; Pg: Diesel pump; Pz: Gas pump).

Oasis	Ksar (village)	Transport by %	Ploughing in %	Threshing in %	Irrigation in %
Alnif	Ammar	100An + 100Tr	100Me	100Me	100K + 100Pg
	Tizi	100An + 70 Tr	100Me	100Me	100K + 100Pg
	Alnif	30An + 35Ch + 100 Tr	100Me	100Me	100K + 100Pg
	Achbarou	45An + 10Ch + 90Tr	100Me	100Me	20K + 95Pg
	Ait Zeggane	100Tr	100Me	100Me	100Pg
	Total	55An + 9Ch + 92Tr	100Me	100Me	64K + 99Pg
Zagora	Asrir N ilemchane	78An + 17Ch + 45Tr	26T + 74Me	21T + 79Me	85Pg + 15Pz
	Tansita	61An + 78Ch + 11Tr	15T + 85Me	10T + 90Me	100Pg
	Amazrou	70An + 85Ch + 5Tr	25T + 75Me	25T + 75Me	100Pg
	Sart	60An + 70Ch + 10Tr	25T + 75Me	25T + 75Me	100Pg
	Aghla Oudrar	70An + 60Ch + 10Tr	15T + 85Me	15T + 85Me	100Pg
	Total	68An + 62Ch + 16,2Tr	21,2T + 79Me	19,2T + 81Me	97Pg + 3Pz
Aoufouss	Takhymte	100An + 10Tr	35T + 65Me	70T + 30Me	100S + 85Pg
	Rbite	100An + 15Tr	65T + 35Me	80T + 20Me	100S + 95Pg
	Zrigate	100An + 5Ti + 5Tr	55T + 45Me	65T + 35Me	100S + 100Pg
	Lamâarka	100An + 5Ti	35T + 65Me	35T + 65Me	100S + 90Pg
	Zaouia Jdida	100An	85T + 15Me	75T + 25Me	100S + 90Pg
	Total	100An + 2Ti + 6Tr	55T + 45Me	65T + 35Me	100S + 92Pg
Rich	Ait Moussa Ouali	100An	30T + 70Me	30T + 70Me	100S + 80Pg
	Zaouia Sidi Boukil	100An + 5Tr	100Me	5T + 95Me	100S + 100Pg
	Balite	100An	20T + 80Me	15T + 85Me	100S + 90Pg
	M'zizel	100An	5T + 95Me	5T + 95Me	100S + 90Pg
	Tamagourte	100An + 5Tr	10T + 90Me	10T + 90Me	100S + 30Pg
	Total	100An + 2Tr	13T + 87Me	13T + 87Me	78Pg
Guelmim	Tighmert	85An + 80Ch + 35Ca	85T + 70Me	85T + 65Me	85K

Oasis	Ksar (village)	Transport by %	Ploughing in %	Threshing in %	Irrigation in %
	Ifrane	80An + 5Ch	90T	95T + 70Me	95K + 20Pg
	Fask	87An + 93Ch + 20Ca	87T + 93Me	93T + 100Me	87K + 27Pg
	Tagante	95An + 63Ch + 37Ca	74T + 58Me	95T + 53Me	89K + 37Pg
	Taghjijt	65An + 70Ch + 5Ca	80T + 70Me	90T+30Me	90K + 15Pg
	Total	82,4An+ 62,2Ch+ 19,4Ca	83,2T + 58,2Me	91,6T + 63,6Me	89K + 20Pg
Tata	Tissint	90An + 50Ch + 5Ca	100T + 25Me	100T + 15Me	70K +45Pg
	Akka	80An + 70Ch + 35Ca	90T + 60Me	90T + 60Me	85K + 25Pg
	Ait Oubelli	80An + 60Ch + 15Ca	85T + 55Me	85T + 65Me	45K + 60Pg
	Foum zguid	75An + 85Ch + 15Ca	85T + 35Me	95T + 45Me	55K + 75Pg
	Foum lahcen	65An + 85Ch + 10Ca	95T + 60Me	1T + 65Me	95K
	Total	78An + 70Ch + 16Ca	91T + 47Me	74,2T + 50Me	70k + 41Pg

Table S4. Coordinates of the different variables studied (farming practices) in axes 1 and 2 of the Principal Component Analysis.

	Axis 1	Axis 2
% of variation explained	37,9%	25,6%
Traditional ploughing	-0,93	0,022
Average area	0,876	-0,249
Area per plot	0,849	0,012
Traditional threshing	-0,839	-0,099
Transport by Tractor	0,739	0,44
Well water irrigation	0,737	-0,215
Average number of plots	-0,694	0,312
Transport by Truck	-0,689	0,28
Mechanical ploughing	0,676	0,253
Mechanical threshing	0,654	0,395
collective properties	0,146	-0,972
Irrigation by Seguia	0,182	-0,963
Private property	0,067	0,954
Transport by Animal	-0,302	-0,678
Transport by Plough	-0,582	0,596
Transport by Three-wheeler	-0,004	-0,476
Habous property	0,069	0,255
Irrigation by Khettara	-0,361	0,575

Table S5. Coordinates of different varieties identified in planes 1 and 2 of the Factorial Correspondence Analysis.

Variety	Axis 1	Axis 2	Group	Variety	Axe 1	Axe 2	Group
V1	0,859	-0,997	Gp5	V94	1,011	-2,558	Gp6
V2	-1,116	1,427	Gp1	V95	0,345	-1,503	Gp6
V3	0,580	-1,674	Gp6	V96	0,296	0,491	Gp4

Variety	Axis 1	Axis 2	Group	Variety	Axe 1	Axe 2	Group
V4	0,806	-1,017	Gp5	V97	-1,430	-0,443	Gp2
V5	0,530	-1,462	Gp6	V98	-1,592	-0,472	Gp2
V6	0,701	-1,216	Gp6	V99	0,498	0,792	Gp4
V7	-0,503	-0,913	Gp2	V100	0,433	1,344	Gp4
V8	0,726	-2,233	Gp6	V101	0,433	1,483	Gp4
V9	0,689	-1,715	Gp6	V102	0,491	1,294	Gp4
V10	-0,145	-0,407	Gp3	V103	0,499	1,404	Gp4
V11	0,804	0,889	Gp4	V104	0,865	1,074	Gp4
V12	0,712	0,767	Gp4	V105	-0,202	0,585	Gp3
V13	0,865	0,805	Gp4	V106	0,768	0,896	Gp4
V14	0,797	1,156	Gp4	V107	0,778	0,835	Gp4
V15	1,110	0,974	Gp4	V108	0,951	0,605	Gp4
V16	0,126	-0,177	Gp3	V109	1,143	0,637	Gp4
V17	0,850	0,810	Gp4	V110	-1,055	-0,710	Gp2
V18	0,911	0,817	Gp4	V111	0,819	0,856	Gp4
V19	0,729	0,775	Gp4	V112	0,381	0,325	Gp4
V20	1,033	0,611	Gp4	V113	0,717	0,963	Gp4
V21	0,847	0,782	Gp4	V114	0,550	0,792	Gp4
V22	0,219	0,871	Gp4	V115	-0,263	0,277	Gp3
V23	0,330	1,324	Gp4	V116	-0,623	0,228	Gp3
V24	0,080	-0,113	Gp3	V117	-1,265	1,405	Gp1
V25	-0,359	0,710	Gp3	V118	-1,350	1,693	Gp1
V27	0,523	-1,754	Gp6	V119	-1,280	1,684	Gp1
V28	0,406	0,446	Gp4	V120	-1,416	1,971	Gp1
V29	1,048	0,854	Gp4	V121	-0,961	1,467	Gp1
V30	0,150	0,069	Gp3	V122	-0,474	0,487	Gp3
V31	1,143	0,666	Gp4	V123	0,416	1,008	Gp4
V32	-0,334	0,189	Gp3	V124	-0,217	0,456	Gp3
V33	0,734	-0,462	Gp5	V125	0,063	0,311	Gp3
V34	0,303	-0,501	Gp3	V126	-0,786	0,571	Gp3
V35	0,345	-1,225	Gp6	V127	-1,095	1,011	Gp1
V36	0,705	-0,706	Gp5	V128	-1,108	1,402	Gp1
V37	0,618	0,882	Gp4	V129	-1,645	1,971	Gp1
V38	0,485	-1,388	Gp6	V130	0,762	1,005	Gp4
V39	-0,063	0,273	Gp3	V131	0,739	0,875	Gp4
V40	1,164	0,794	Gp4	V132	0,677	0,802	Gp4
V41	0,516	-0,378	Gp5	V133	0,842	0,949	Gp4
V42	0,595	0,821	Gp4	V134	-0,980	-0,661	Gp2
V43	0,308	-0,209	Gp3	V135	0,082	-0,350	Gp3

Variety	Axis 1	Axis 2	Group	Variety	Axe 1	Axe 2	Group
V44	-0,394	-0,549	Gp3	V136	0,580	-0,846	Gp6
V45	-1,097	-0,613	Gp2	V137	0,090	-0,280	Gp3
V46	1,051	-1,084	Gp5	V138	0,366	-1,510	Gp6
V47	0,717	-1,212	Gp6	V139	0,262	-1,508	Gp6
V48	0,583	0,801	Gp4	V140	-1,476	-0,569	Gp2
V49	0,716	0,877	Gp4	V141	0,525	-1,545	Gp6
V50	0,926	0,797	Gp4	V142	0,648	-1,718	Gp6
V51	0,244	-0,145	Gp3	V143	0,926	-0,250	Gp5
V52	0,483	-1,346	Gp6	V144	0,927	-0,206	Gp5
V53	0,031	0,277	Gp3	V145	0,991	-1,017	Gp5
V54	-0,236	-0,258	Gp3	V146	1,110	-0,474	Gp5
V55	-0,269	-0,097	Gp3	V147	0,981	-0,934	Gp5
V56	0,312	-1,388	Gp6	V148	0,818	0,510	Gp4
V57	0,597	-0,367	Gp5	V151	0,907	0,415	Gp4
V58	-0,154	-0,268	Gp3	V153	-1,695	-0,594	Gp2
V59	-1,125	-0,721	Gp2	V154	-1,577	-0,565	Gp2
V60	0,161	-1,370	Gp6	V155	-1,675	-0,574	Gp2
V62	0,370	-1,118	Gp6	V156	-1,658	-0,503	Gp2
V63	-0,375	-0,563	Gp3	V157	-1,594	-0,513	Gp2
V66	0,811	-1,495	Gp6	V158	-1,593	-0,540	Gp2
V67	0,536	-1,827	Gp6	V159	-1,908	-0,606	Gp2
V68	0,530	-1,809	Gp6	V160	-1,640	-0,497	Gp2
V69	-0,433	0,077	Gp3	V161	-1,719	-0,527	Gp2
V70	0,536	0,792	Gp4	V162	-1,654	-0,594	Gp2
V71	-0,666	0,107	Gp3	V163	-1,952	-0,576	Gp2
V72	-0,493	0,375	Gp3	V164	-1,709	-0,583	Gp2
V73	0,569	-0,343	Gp5	V165	0,834	0,793	Gp4
V74	0,543	-1,665	Gp6	V166	0,664	0,900	Gp4
V75	0,462	0,499	Gp4	V167	0,698	0,788	Gp4
V77	1,172	0,884	Gp4	V168	0,783	0,776	Gp4
V78	0,550	0,544	Gp4	V169	0,862	0,954	Gp4
V79	0,550	-1,634	Gp6	V170	0,930	0,896	Gp4
V80	-0,057	0,222	Gp3	V171	0,762	0,898	Gp4
V81	0,407	1,477	Gp4	V172	0,899	0,813	Gp4
V82	0,439	1,523	Gp4	V173	0,782	0,778	Gp4
V83	0,452	1,179	Gp4	V174	0,902	0,904	Gp4
V84	0,577	1,136	Gp4	V175	0,842	0,865	Gp4
V86	0,872	1,074	Gp4	V177	0,684	0,998	Gp4
V88	0,510	1,478	Gp4	V179	0,937	0,919	Gp4

Variety	Axis 1	Axis 2	Group	Variety	Axe 1	Axe 2	Group
V89	0,551	1,344	Gp4	V180	0,978	0,821	Gp4
V90	0,609	0,798	Gp4	V181	0,883	0,782	Gp4
V91	-0,849	-0,006	Gp3	V182	1,151	0,918	Gp4
V92	-0,982	-0,821	Gp2	V183	0,725	0,842	Gp4
V93	-1,111	-0,546	Gp2				

Table S6. The different varieties making up group 3 of the Factorial Analysis.

Group 3	
Guelmim	V124 Olive Tree: <i>Meknasia</i>
	V125 Olive Tree: <i>Haouzia</i>
	V16 Barley: <i>Beldi</i>
	V24 Corn: <i>Byed</i>
	V30 Fava Bean: <i>Bayda</i>
	V44 Tomato
	V51 Turnip: <i>Romi</i>
	V54 Zucchini
Alnif-Zagora-Aoufouss-Rich-Guelmim-Tata	V55 Gourd: <i>Mkerkba</i>
	V58 Eggplant
	V63 Cabbage
	V69 Parsley
	V72 Alfalfa: <i>Beldia</i>
	V80 Fig tree: <i>Byed</i>
	V105 Apricot: <i>Beldi</i>
	V115 Almond: <i>Lhlou</i>
Alnif-Rich	V10 Durum wheat: <i>Zerban</i>
Guelmim-Tata	V43 Carrot: <i>Sfer</i>
	V25 Corn: <i>Hmer</i>
	V32 Fava Bean: <i>Kehla</i>
	V34 Pea: <i>Beldia</i>
Alnif-Aoufouss-Rich-Guelmim-Tata	V53 Chili pepper
	V116 Apple tree: <i>Beldi</i>
	V122 Olive Tree: <i>Beldi</i>
	V126 Quince tree
Alnif-Zagora-Aoufouss-Guelmim-Tata	V135 Date palm: <i>Bouffeggouss</i>
	V137 Date palm: <i>Khelt</i>
Alnif-Rich-Guelmim-Tata	V39 Potato: <i>Hamra</i>
Aoufouss-Rich-Guelmim-Tata	V71 Mint
Alnif-Zagora-Aoufouss-Rich	V91 Fig tree: <i>Hmer</i>

Table S7. The different varieties making up group 1 of the Factorial Analysis.

Group 1

Rich	V2	Durum wheat: <i>Aghzzaf</i>
	V117	Apple tree: <i>Romi</i>
	V118	Apple tree: <i>Stark</i>
	V119	Apple tree: <i>Golden</i>
	V120	Apple tree: <i>Mchrat</i>
	V121	Apple tree: <i>Lgala</i>
	V127	Peach tree
	V128	Walnut
	V129	Prickly pear

Table S8. The different varieties making up group 2 of the Factorial Analysis.

Group 2		
Aoufouss	V97	Pomegranate tree: <i>Alânsri</i>
	V98	Pomegranate tree: <i>Khrifi</i>
	V153	Date palm: <i>Akadousse</i>
	V154	Date palm: <i>Bid Djan</i>
	V155	Date palm: <i>Ras Latmer</i>
	V156	Date palm: <i>Initfite</i>
	V157	Date palm: <i>Bousserdoune</i>
	V158	Date palm: <i>Maäjoune</i>
	V159	Date palm: <i>Kerna</i>
	V160	Date palm: <i>Kerchaou</i>
	V161	Date palm: <i>Admou</i>
	V162	Date palm: <i>Bellahzid</i>
	V163	Date palm: <i>Ouhefssa</i>
	V164	Date palm: <i>Ouâamrane</i>
Alnif-Aoufouss	V7	Durum wheat: <i>Korite</i>
	V140	Date palm: <i>Bouslikhen</i>
	V59	Lettuce
Zagora-Aoufouss	V45	Okra: <i>Hamra</i>
Alnif-Aoufouss-Rich	V93	Fig tree: <i>Ain Lhajla</i>
Alnif-Zagora-Aoufouss-Tata	V134	Date palm: <i>Mejhoul</i>
Alnif-Zagora-Aoufouss	V110	Grapevine: <i>Non précis</i>
	V92	Fig tree: <i>Khder</i>

Table S9. The different varieties making up group 4 of the Factorial Analysis.

Group 4		
Tata	V11	Durum wheat: <i>Tafilalet</i>
	V12	Durum wheat: <i>Tizekrte</i>
	V15	Soft wheat: <i>Tagourarte</i>
	V18	Barley: <i>Azemez</i>
	V19	Barley: <i>Bour</i>
	V20	Barley: <i>Amazigh</i>
	V21	Barley: <i>Lalten</i>
	V29	Millet
	V31	Fava Bean: <i>Ouarzazate</i>
	V40	Onion: <i>Romi</i>
	V50	Turnip: <i>Mahfour</i>
	V77	Alfalfa: <i>Moapa</i>
	V86	Fig tree: <i>Tafounaste</i>
	V104	Apricot: <i>Roumi</i>
	V108	Grapevine: <i>Bzoul Lâawda</i>
	V109	Grapevine: <i>Mouska</i>
	V172	Date palm: <i>Bouswayer</i>
	V173	Date palm: <i>Najda</i>
	V174	Date palm: <i>Tabouâtrite</i>
	V175	Date palm: <i>Amennan</i>
	V176	Date palm: <i>Tiskerte</i>
	V177	Date palm: <i>Boulkissane</i>
	V178	Date palm: <i>M-teglay</i>
	V179	Date palm: <i>Saoudi</i>
	V180	Date palm: <i>Boudi</i>
	V181	Date palm: <i>Tighlo</i>
	V182	Date palm: <i>Bimon</i>
	V183	Date palm: <i>Boutwala</i>
Guelmim	V22	Barley: <i>Mderma</i>
	V23	Barley: <i>Non précis</i>
	V81	Fig tree: <i>Abachile</i>
	V82	Fig tree: <i>Tamelka</i>
	V85	Fig tree: <i>Tagordante</i>
	V86	Fig tree: <i>Tagourdante</i>
	V87	Fig tree: <i>Iâissa</i>

Guelmim-Tata	V88	Fig tree: <i>Espagnol</i>
	V100	Pomegranate tree: <i>Roudani</i>
	V101	Pomegranate tree: <i>Elâadmi</i>
	V103	Apricot: <i>LouzMechmach</i>
	V123	Olive Tree: <i>Dahbia</i>
	V166	Date palm: <i>Ist-Taghjijte</i>
	V13	Durum wheat: <i>Ouchen</i>
	V14	Soft wheat: <i>Azouga</i>
	V17	Barley: <i>algouz</i>
	V42	Carrot: <i>Sfer</i>
	V48	Turnip: <i>Elfejli</i>
	V49	Turnip: <i>Tagherdayte</i>
	V70	Coriander
	V75	Alfalfa: <i>Canada</i>
	V83	Fig tree: <i>Bakour</i>
	V84	Fig tree: <i>Laghdania</i>
Zagora-Tata	V89	Fig tree: <i>Bzzolte Lâawda</i>
	V90	Fig tree: <i>Kehla</i>
	V102	Pomegranate tree: <i>Sefri</i>
	V106	Grapevine: <i>Bayda</i>
	V107	Grapevine: <i>Kehla</i>
	V111	Orange tree: <i>Zenbouh</i>
	V112	Orange tree: <i>Navel</i>
	V113	Mandarin tree
	V114	Almond: <i>Elhar</i>
	V130	Carob tree
	V131	Pear tree
	V132	Lemon tree: <i>Beldi</i>
	V133	Lemon tree: <i>Roumi</i>
	V165	Date palm: <i>Bouwtoub</i>
	V167	Date palm: <i>Tamoucha</i>
	V168	Date palm: <i>Admam</i>
	V169	Date palm: <i>Boutefah</i>
	V170	Date palm: <i>Taghanimte</i>
	V171	Date palm: <i>Tahdadte</i>
	V151	Date palm: <i>M'ket</i>

Alnif-Guelmim-Tata	V78	Alfalfa: <i>Amércaine</i>
Zagora-Guelmim-Tata	V148	Date palm: <i>Bousakri</i>
Aoufouss-Guelmim-Tata	V99	Pomegranate tree: <i>Alhamed</i>
Rich-Guelmim-Tata	V37	Bean
Alnif-Aoufouss-Guelmim-Tata	V28	Sorghum
Alnif-Zagora-Rich-Guelmim-Tata	V96	Pomegranate tree: <i>Beldi</i>

Table S10. The different varieties making up group 5 of the Factorial Analysis.

Group 5		
Zagora	V46	Okra: <i>Mchewka</i>
	V145	Date palm: <i>Aglid</i>
	V147	Date palm: <i>Aherdane</i>
Zagora-Tata	V144	Date palm: <i>Klane</i>
	V146	Date palm: <i>Bourar</i>
Alnif-Tata	V36	Chickpea
Alnif-Zagora-Tata	V1	Soft wheat: <i>Non précis</i>
	V4	Soft wheat: <i>Achtar</i>
	V33	Lens
Zagora-Guelmim-Tata	V143	Date palm: <i>Jihl</i>
Alnif-Zagora-Guelmim-Tata	V57	Beet
Alnif-Zagora-Aoufouss-Rich-Guelmim-Tata	V41	Onion: <i>Beldi</i>
	V73	Alfalfa: <i>Australia</i>

Table S11. The different varieties making up group 6 of the Factorial Analysis.

Group 6		
Alnif	V3	Durum wheat: <i>Aberyoune</i>
	V5	Durum wheat: <i>Aksad</i>
	V8	Durum wheat: <i>Merzouka</i>
	V27	Corn: <i>Rich</i>
	V35	Pea: <i>Romia</i>
	V66	Sesame
	V67	Watermelon
	V68	Melon
	V74	Alfalfa: <i>Saoudia</i>
	V79	Forage sorghum
	V94	Fig Tree: <i>Foukaâ</i>
	V95	Fig Tree: <i>Targuiyte</i>
	V138	Date palm: <i>Azizaw</i>
	V139	Date palm: <i>Toungalte</i>
	V142	Date palm: <i>Lferch</i>
Alnif-Zagora	V141	Date palm: <i>Tazggaghte</i>
	V62	Garlic

	V9	Soft wheat: <i>Nesma</i>
Alnif, Zagora, Aoufouss	V47	Okra: <i>Retba</i>
	V56	Gourd: <i>Slawi</i>
Alnif-Zagora-Rich	V38	Potato: <i>Bayda</i>
	V52	Bell pepper
Alnif-Tata	V6	Durum wheat: <i>Karim</i>
Alnif-Aoufouss	V60	Cucumber
Alnif, Zagora, Aoufouss-Tata	V136	Date palm: <i>Tahmoute</i>

Supplementary S1. Survey conducted with farmers.

1- Sheet n° :

2-Date :

3-Commune :

4-Ksar (village) :

A. SOCIO-DEMOGRAPHIC DATA

• Main activity:

1- Fellah (farmer)

2- Other

• Age :

• Marital status:

1- Married

2- Single

3- Divorced

4-

Widower

• No. of children:

• Married and living with you:

• No. of family members:

B. EDUCATION

• Level of education:

1- Illiterate

2- Masjid

3- Primary school

4- High school

5-

Other:

• No. of children attending school:

1- Boys:

2- Girls:

• Otherwise, what do they do for a living?

1- Family farming

2- employee

3- Other:

C. PROPERTY CHARACTERISTICS

• Total area:

• No. of plots:

• Area per plot:

• **Property type:**

D. FARM EQUIPMENT

Transportation: -Animal -Plow - Tractor - Truck
Ploughing and sowing: - Traditional - Mechanical
Harvesting and threshing: - Traditional - Mechanical
Irrigation: - Traditional -Other:
Other equipments:

• **Cereals**

Species and varieties	Origin	Area size (ha)	Yield (kg)	Tendency	Price Dh/Kg		Storage type	Uses
					Purchase	Sales		

• **Pulses**

Species and varieties	Origin	Area size (ha)	Yield (kg)	Tendency	Price Dh/Kg		Storage type	Uses
					Purchase	Sales		

• **Fruit trees**

Species varieties	Origin	No. of tree	Uses		Multiplying mode	Transformations
			Feed	Other		

• **Date palm**

Variety	Color	Consistency	Form	Bayoud sensitivity	Selling price	Uses	Transformation

• Vegetables:

Species	Variety	Seed origin	Area size (ha)	Production	Yield	Uses

• Forage crops:

Species	Variety	Seed origin	Area size (ha)	Production	Yield	Uses

• Livestock

Species	Race	Number of livestock	feeding	Products	Destination
Cattle					
Sheep					
Goats					
Other					

✓ **Planted and exploited species:**

✓ **Remarks:**