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Abstract. *As from 1956 to 1991, agricultural land and farming practices in Malta have undergone various changes. There has been a 42% decline in agricultural land area. Fragmentation is a dominant feature with about 13,000 holdings still prevailing. Whole-time farmers have decreased by 80% to 1,473 whilst part-time farmers have increased by 42% to 13,807. Over two million kilos of fertilizer, which are predominantly nitrogenous, together with considerable amounts of pesticides are now being imported. The surge in livestock production and the inadequacy of the system to cater for effluent disposal are further adding pressure to the limited land resource.*

Titre. Vue d'ensemble de l'utilisation des terrres à Malte.

Résumé. De 1956 à 1991, les exploitations agricoles maltaises ont subi divers changements. Ce fut d'abord une diminution de 42% des terres cultivables. Ensuite, le morcellement est très important avec environ 13.000 exploitations toujours existantes. On compte 1.473 exploitants à plein temps, soit une diminution de 80%, et 13.807 à temps partiel, soit une augmentation de 42%. Plus de 2 millions de kg de fertilisants, notamment l'azote, et des quantités importantes de pesticides sont actuellement importés. L'augmentation du cheptel et l'incapacité du système à canaliser les eaux polluées représentent des dangers supplémentaires pour des ressources déjà limitées de la terre.

Keywords. Malta – Agriculture – Land use – Land types – Fragmentation – Tenure – Resource management.

Agriculture embraces a wide view of connections that encompass biological, economic, political, social and cultural aspects. Within the economic system, farming is competing with other users for resources of land, labour, capital and management. However the position of agriculture is also concerned with the environment for, from a system's viewpoint, agriculture is the result of man's activity on the natural environment.

Because of a higher level of economic development, off-farm resources such as feed, fertilizers, pesticides, fuel and machinery are also being used as substitutes for traditional farm inputs. A related change in the agricultural system is therefore to be expected.

A study of agricultural land use for the period 1956 to 1991, shows that total agricultural land has decreased from 20,433 ha to 11,902 ha in a thirty-five year period. This 42% decrease in total land area was only temporarily deviated in the early 1970s following a change in government agricultural policies. Yet, while provisional 1991 figures show that this rate of decline has stopped, only 38% of the total land area is still arable. Of these 12,000 ha, only 6% is irrigated or semi-irrigated and only 0.2% is covered by greenhouses.

Further analysis of agricultural land types shows that dry agricultural land also decreased overall by 41%. Wasteland decreased by 54%, while irrigated land has shown only a decrease of 11% when semi-irrigated land is also considered. This decrease would have otherwise been 25%, but is proportionately less affected—mostly due to legislation protecting irrigated land, the Sant' Antnin recycling project and increased adoption of irrigation techniques, mostly drip irrigation, in the 1980s.

Comparing land usage patterns with the number of agricultural holdings, it becomes evident that fragmentation increased sharply in the early 1970s with the decrease of 7% up to that point in time shifting to a 3% increase on the 1956 figures, despite the 42% decrease in total land area. In fact, provisional figures show 12,958 holdings in 1991 as compared to 12,640 in 1956.

It can be generally said that land in Malta is now owned 2/3 by the state and the remaining 1/3 by the private sector, however only a low percentage of agricultural land is farmer-owned. Both the state and private land owners tend to hold to their property and sales are mostly evident only when the property is to be developed for building reasons. Under this system, farmers would tend to invest only in their private property due to the risk of not continuing to hold tenure on their land.

While the Agricultural Leases (reletting) Act of 1967 regulates land tenure in Malta with the objective of protecting farmers from eviction, this is still possible where: a) there is disagreement on the increase of rent payable to the landlord; b) the landlord requests that he or a member of his family will cultivate the land; c) the land is covered by a building permit (unless it is irrigated); d) the land has been left idle for more than twelve consecutive months.

Similar analysis of whole-time farmers and part-time farmers shows an upward trend in numbers in the 1970s. This is attributable to government policies that did little to stop the fragmentation process and that furthermore linked the provision of a grant scheme to individual petitions by full-time or part-time farmers. Despite this, and even the setting up of an agricultural corps to help in a development of an agricultural programme, whole-time farmers now total 1,473 and are 80% below 1956 figures. It should however be considered that there has been an increasing trend for part-time farming—with figures reaching 13,807 or an increase of 42% on 1956 figures. The situation concerning the total number of farmers shows that these have decreased by 11% on the 1956 numbers. The result is that the average area per farmer has decreased from 1.18 ha to 0.78 ha—a 34% decline.

The aggregated results of this data reflect important structural changes in Maltese agriculture that are linked concurrently with important social and economic processes. The urban sprawl, together with fragmentation, has created enormous pressure on agricultural land. Furthermore the advent of improved technology has resulted in increased usage of mechanisation for land management. Figures for small powered units and larger tractors have increased from 554 and 57 respectively in 1956, to 6071 and 264 in 1981. Such an increase indicates the potential effects on agronomic practices.

From a resource management aspect, despite this increase in mechanisation, management of arable land still has its shortfalls. Maintenance of rubble walls appears to be a dying practice and tillage of fields is not always done parallel to the contours, thus erosion is facilitated. Further protection and maintenance via usage of windbreaks, bushes or trees is also not so evident, increasing further erosion dangers during strong winds or rains.

Recent attempts to modify such losses or to improve on surviving land patches through prevailing methods of land reclamation are inadequate, as these take no consideration of the chemistry or biology of the soil. In other cases where areas other than farmland are being “reclaimed”, the method of adding town refuse will very likely give rise to a microbial population and toxins that would not be so favourable to soil microfauna and microflora (Bowen Jones *et al.*, 1961). In these cases, effects of infestation by parasites or fungi can further add to soil deterioration.

Waterways for run-off are usually non-existent and more often than not gully or sheet erosion result due to excess water flow. Therefore in respect of soil conservation, excluding the workability of the Soil Protection Act and the consequent preservation of the soil resource, better management practices need to be applied.

In the majority of cases, Maltese soils have a reasonably good structure (Bowen Jones *et al.*, 1961), but cropping always creates most stresses for the soil and its fertility. The practice of resorting to organic and

chemical fertilizers together with pesticides, and their method of application, is changing certain soil characteristics. The tradition of using organic fertilizers is being encroached by the usage of chemicals.

Fertilizer data shows that quantity-wise and value-wise there is a trend for a decrease of imports as from 1984, however around 2.2 million kg of fertilizer valued at Lm200,000 are still being imported. This is equivalent to an application of about 185 kg of fertilizer per ha. The most prominent analysis of available data shows that while in 1983/84 the percentage nitrogen by weight of imports ranged between 45 to 59%, this is now about 87% or almost double. There is also an indication that cheaper, but stronger, nitrogen fertilizers are being imported (Meli, 1992).

Another aspect regarding fertilizer usage is the traditional spreading of manure in heaps early in September prior to the onset of the first heavy rains. There is a marked preference for the usage of cow manure, however usage of pigs' slurry or chicken litter is not infrequent. Since at times this manure is not incorporated or ploughed into the soil straight away, heavy rainfall will cause leaching of nitrates from the heaps, this renders this method of fertilizer application ineffective and furthermore adds to ground water pollution. Improvements in management techniques could again help in safeguarding both soil and water quality.

Contrary to the case of fertilizers, the limited pesticide data available indicates an increase in the value of imports in 1989 by about 62% over 1983 figures. In all these years, the value of imported fungicides was about 10%, with insecticides constituting the bulk of imports. Sample analysis indicates that as from 1989, at least 25% of imported agricultural pesticides belonged to the organophosphate group. Increased imports may also be attributed to improper usage, which, added to spraying during windy days with no stabilising dispersants, complicates the mistarget factor (Meli, 1992).

Livestock production in Malta is extremely intensive with cattle, pigs, poultry or rabbits being kept in stockyards or cages most of the time. This is primarily necessitated by land shortage. In the past fifty years, major changes have taken place in the Maltese livestock industry. From milk and meat production traditionally related to goat breeding, there has been a shift towards dairy industrial production through massive utilisation of animal feeds.

It is estimated that there are about 20,700 heads of cattle, 7,900 sheep, 5,400 goats, 58,000 pigs, 3.3 million chickens and 1.4 million rabbits. The sources of feed for livestock are concentrates, whose ingredients are imported, and roughage from whole crop cereals, mostly wheat and barley, together with some legumes, mostly sulla (Meli, 1992).

The housing facilities for livestock are variable. Those constructed in the 1960s and 1970s need modernisation while other recent constructions could have had better designs. In the planning and design of most of these buildings there is not adequate provision either for the storage of feeds and / or the manure produced. It is very evident that the development of the livestock sector has not been fully conscious of the hazards of livestock farming to the environment.

As livestock production is intensive, all dung and urine is concentrated in the buildings and yards where the enterprise operates. Manure from cattle, sheep and goats accounts for 60% of total production, whilst pigs and poultry account for 25% and 15% respectively. On cattle farms, the solid waste is stored and sold to crop farmers during the months of August and September. Some pig slurry is also used for crop production. Poultry manure, when dry, is also sold to crop farmers (Meli, 1992).

Most storage and disposal systems are inadequate. Cattle farms store the solid manure in heaps but most of the liquid component is allowed to run off. As no pits are present, rainwater on the solid manure, together with the other runoff, probably contributes to underground water pollution. Some 40% of pig farms do have cesspits but most of these are not big enough to handle more than a few days' effluent and furthermore, since they are not waterproof, they could also be seeping directly to underground water. On farms with limited storage, slurry is transported out to either crop farms in August and September, or

to the nearest sewer where it enters the domestic sewage disposal system. On farms where there is no storage, the slurry is also piped away to a sewer. It is estimated that 80% of pig effluent ends up in the sewerage system. Distribution of liquid fertilizer accounts for 12%, while the remaining 8% is solid manure. The density of livestock per hectare of arable land in Malta and Gozo is high, and since a high proportion of feed for livestock is imported, there could be a build up of nutrients in the soil. (Meli, *op. cit.*, 1992)

Conclusion

This overview has been confined to giving a general appraisal on trends in agricultural land use in the Maltese Islands. Specific quantification of particular aspects is limited by lack of readily available data and thus only problems arising from current agricultural practices have been identified. The loss of land within the agricultural sector is mostly due to the urbanisation process and also as a result of changes within agriculture itself—particularly through the increased incidence of part-time farming. Apart from fragmentation and degenerating land management practices, other hazards of environmental concern appear to be nitrate, phosphate and pesticide pollution, mainly as a result of misuse and/or overuse of chemicals and livestock production.

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Appendix

Farming Population and Number of Holdings in Malta (1956–1991)

	Whole-time farmers			Part-time farmers			Total farmers			Agricultural holdings		
Year	Malta	Gozo	Total	Malta	Gozo	Total	Malta	Gozo	Total	Malta	Gozo	Total
1956	5 468	2 025	7 493	7 573	2 176	9 749	13 041	4 201	17 242	9 123	3 517	12 640
1961	5 114	2 216	7 330	7 174	1 641	8 815	12 288	3 857	16 145	8 340	3 184	11 524
1966	4 486	1 797	6 283	6 772	1 843	8 615	11 258	3 640	14 898	7 867	3 089	10 956
1971	4 027	1 609	5 636	6 538	1 786	8 324	10 565	3 395	13 960	7 690	2 909	10 599
1976	4 710	1 309	6 019	8 144	2 634	10 778	12 854	3 943	16 797	8 737	3 083	11 820
1981	3 376	976	4 352	8 562	2 361	10 923	11 938	3 337	15 275	8 805	2 937	11 742
1986	1 933	585	2 518	9 558	2 716	12 274	11 491	3 301	14 792	8 930	2 921	11 851
1991	1 248	225	1 473	10 865	2 942	13 807	12 113	3 167	15 280	10 157	2 801	12 958

Source: Central Office Statistics, *Census of Agriculture*, 1956-1983 (1986 unpublished and 1991 provisional).

Agricultural Land (1956–1991)

	Dry			Irrigated			Waste			Total		
Year	Malta	Gozo	Total	Malta	Gozo	Total	Malta	Gozo	Total	Malta	Gozo	Total
1956	13 392	3 676	17 068	704	112	816	2 304	246	2 550	16 400	4 033	20 433
1961	11 864	3 132	14 996	615	78	693	2 120	198	2 318	14 599	3 408	18 007
1966	10 885	2 867	13 752	632	61	693	1 794	234	2 028	13 314	3 162	16 476
1971	9 984	2 641	12 625	568	59	627	1 740	198	1 938	12 292	2 898	15 190
1976	9 777	2 390	12 167	648	43	691	1 636	224	1 860	12 061	2 657	14 718
1981	8 938	2 093	11 031	552	34	586	1 424	191	1 615	10 914	2 318	13 232
1986	7 958	1 920	9 878	627	37	664	1 282	162	1 444	9 867	2 119	11 986
1991	8 454	1 544	9 998	681	42	723	1 030	151	1 181	10 165	1 737	11 902