

AGRICULTURAL PRODUCTION AND FERTILIZER USAGE IN SWAZILAND

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Background data

This brief description of 'Agricultural Production and Fertilizer Usage in Swaziland' is produced as a short review paper.

Only salient points have been highlighted with the inevitable omission of much relevant and important detail.

Area, population, climate and soils

Swaziland, with an area of only 17 364 sq km, is one of the smallest countries in continental Africa.

The population projection made on the basis of past census suggests a current total of half a million people which is expected to rise to over one million by the year 2000. The population density is presently 28,4 per sq km, on a par with much of tropical west Africa and east Africa. This land pressure, which will possibly rise to over 60 per sq km within 25 years, makes a dramatic improvement in agricultural production essential.

Situated on the edge of the Southern African Highveld escarpment to the west, and bounded by the Lubombo escarpment to the east, Swaziland despite its small size can be divided into four quite distinct physiographic regions. Some average climate data, areas and altitudes for these regions are shown in Table 1.

The country is crossed by several perennial rivers amounting to considerable irrigation potential as yet not fully utilised.

Potential arable and non-arable land has been broadly identified on the basis of land capability classification. This classification reflects natural characteristics (soils, slopes etc) and takes no account of social and economic conditions or prevailing levels of agricultural technology,

TABLE 1 Swaziland: Some average climate data, areas and altitudes for the four main regions

Region:	Altitude	Area	Rainfall	Drought
West to East	range (masl)	sq km	range mm	hazard %
Highveld	900-1800	5 030	1000-2300	20
Middleveld	300-1000	4 597	750-1200	20-45
Lowveld	60- 700	6 416	500- 900	40-80
Lubombo	275- 800	1 321	625-1000	40-60

TABLE 2 Swaziland: Land capability assessment

Land class	Notes	Area '000 ha	Percentage
Class I-III	Arable land 0-12% slope	385	22
Class IV	Poor arable - good grazing	344	20
Class V	Wet land and rivers	49	3
Class VI-VII	Grazing land	452	26
Class VIII	Steep and rocky	506	29
Total all land		1 736	100

(Source: 2nd Nat. Dev. Plan. 1973-77)

the former considerations being of considerable importance in relation to land tenure. Nevertheless, an indication of maximum physical potential available for development is achieved (Table 2).

The obvious feature of this table is that marginal land, where improvement to grazing is unlikely, and unusable land amount to more than 58 per cent of the total area.

Land tenure

Swaziland has an historical legacy of land division. Some 47 per cent of the country was made over to individual tenure (ITF), largely at the turn of the century, and awarded legal title. Just over 0,5 per cent of the land has already been absorbed by rapidly expanding urban areas and the remaining 52 per cent is held by the King in trust for the Swazi Nation and is administered through traditional procedures.

Individual ownership of land as such is not recognised on Swazi Nation Land (SNL). Land under customary tenure is divided into Chieftoms and each Chief allocates arable plots and a homestead to each farming family in his domain while the remaining land is grazed communally.

TABLE 3 Swaziland: Size distribution of holdings on Swazi Nation Land

Size	Number of holdings in each size class as % of total number by region				Total in each class
	Highveld	Middleveld	Lowveld	Lubombo	
Less than 1 ha	28,9	27,6	18,5	39,4	5,5
1-5 ha	64,2	63,7	54,6	52,6	53,1
Greater than 5 ha	6,9	8,7	26,9	8,0	41,4

From the sample census conducted in 1970 an estimated 38 800 small-holdings existed in Swaziland, a figure which may now have increased with rural population pressure. On the other hand ITF numbered only 589 in 1974. The size distribution of holdings on SNL is shown in Table 3.

Broadly speaking the majority of holdings are between 1 and 5 ha, similar to findings elsewhere in Africa that ± 4 ha is the greatest arable area which can be effectively cultivated by family labour without power-driven machinery. There is a noteworthy variation in holding size between regions, particularly the Lowveld where holding size is larger due to drought hazard.

Agricultural production

The division of land by physiographic region and again by tenure has a profound effect on the pattern of agricultural production. A breakdown of land-use, as distinct from land capability (Table 2), is provided in Table 4.

TABLE 4 Swaziland: Land use 1973-74, hectares

Land use	Swazi Nation Land (SNL)(2)	Individual Tenure Farms (ITF)	Whole country
Cropland:	101 394	56 513	157 907
of which in crops	86 285	47 037	133 322
Grazing land:	801 581	522 472	1 324 053
of which improved	—	124 436	124 436
Commercial forests	—	101 980	101 980
All other land (1)	6 873	136 343	143 216
Urban areas	—	—	9 300
Total land	909 848	817 308	1 736 456

Source: Central Statistics office, Mbabane.

(1) includes roads, houses, mining areas

(2) since 1973 the development of commercial sugar and forests on SNL has altered these figures slightly.

Some 152 000 ha are under non-agricultural usage and consequently of no further interest in this context.

Major products with little fertilizer demand

One hundred and two thousand ha or 5,9 per cent of the country is under indigenous or planted timber. This falls into the ITF category and as such occupies nearly 12,5 per cent of the available land in this sector. While contributing substantially to agricultural income with 1974

total earnings of E36,5 million the industry utilises very little in the way of fertilizer products.

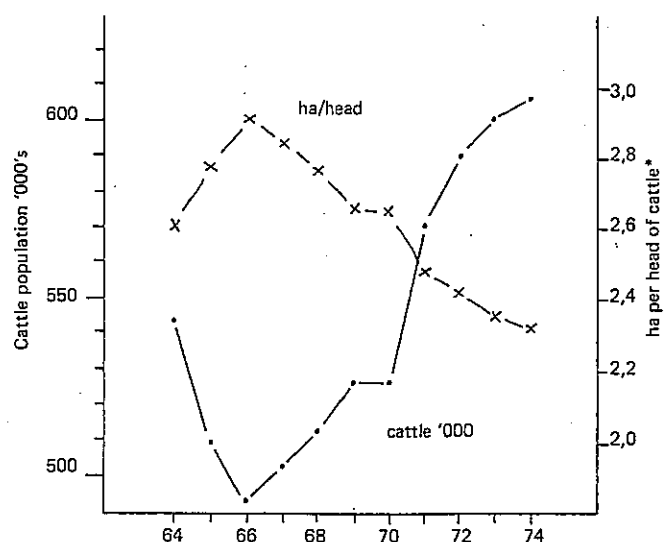
The long-term wisdom and implications of this are subject to considerable discussion and may need revision in the near future.

Likewise the grazing lands totalling 1,32 million ha, while supporting over 600 000 head of cattle and in excess of 80 000 livestock units (LSU) of other domestic animals, generate a negligible demand for applied nutrients. Most of the 124 000 ha designated improved grazing results from bush clearing rather than replanting to superior swards and fertilization.

It is interesting that while steadily increasing numbers, and occupying over 76 per cent of the total available land, livestock provide a disproportionately minor contribution to domestic exports at E5,2 million in 1974.

Livestock populations on ITF land is calculated at 4,2 ha per head based on grazing area (Table 4) and estimated LSU's 124 750 whereas the LSU's on SNL amount to 455 250 on an area combining grazing and cropland of 902 975 ha or just 2 ha per LSU. The projection towards impending catastrophe is self-evident in Figure 1. However, population increase has apparently tailed off since 1972.

The capital value of the national herd can be estimated in excess of E60 million. Were it possible to increase take off to 20 per cent, an additional E7 million would accrue to the gross national income. This will not materialise unless there is a dramatic improvement in grazing provision. Current sales (1974) only just exceed 10 per cent, the bulk of which is low quality attracting less than E60 per head.



*based on total 1,43 million ha in 1973-74
=SNL crop and grazing land + ITF grazing

FIG 1 Swaziland: Cattle population 1964-1974 and ha per head of cattle

Attempts to accelerate exploitation of the national herd through the Government holding grounds and fattening ranches have only met with minor success principally because of the places of cattle in traditional rural life.

As well as a national asset which forms an integral part of the agro-social pattern, the overwhelming livestock population is also a liability accelerating erosion through over-grazing and competing for land with arable crops.

Major exportable products using fertilizer

Sugarcane which accounts for 20 000 ha or 42 per cent of the developed cropland on the ITF lands dominates the commercial production sector with earnings of E48 million in 1974, approximately 40 per cent of total domestic exports.

Cotton production reached a new peak in 1974 due to the exceptionally high prices offered for seed cotton of up to 36c per kg. Area planted is difficult to estimate but available census figures suggested 10 934 ha in 1973-74 yielding 17 644 tonnes of seed cotton. The average yield using these figures at 1 614 kg per ha is rather high indicating that the planted area may be much greater, realistically at \pm 15 000 ha. Total export earnings are not reflected in the 1974 statistics, where a provisional figure of E1,1 million occurs, but was assumed to exceed E5,2 million. The important aspect of cotton production is that unlike the other major commercial crops more than 35 per cent (1974) is produced on SNL, a proportion which further increased during 1975.

Citrus, with oranges and grapefruit as the majority, covering 2 611 ha in 1974 received export earnings of E4,5 million.

Pineapples are rapidly becoming a further major crop with over 1 000 ha in 1974-75 which together with miscellaneous canned citrus products contributed a further E2,7 million to export earnings.

Paddy rice has declined in area from 2 400 ha in 1970 to 1 100 ha in 1974 but still earned more than E0,9 million. Tobacco with a modest 570 ha earned E0,2 million in 1974 but is now rapidly expanding.

Other exported agricultural produce contributed no more than E0,9 million mainly from ITF holdings.

Thus the major crops with the exception of cotton, are dominated by ITF producers. The ranking of the main export earners is shown in Table 5.

These figures (Table 5) and the foregoing discussion serve as a guide only; with widely fluctuating world commodity values comparative figures between years bear little relation to one another and without finalised figures, export earnings within the major crop sector during 1975 are expected to be well below the 1974 figures, although some improvement is hoped for in the current year.

TABLE 5 Swaziland: Major export earners in the agricultural sector, 1974

Crop	Export earnings E million	Area planted ha	Export earnings in E per ha (not farm earnings)
Sugarcane	48,0	20 000	2 400
Timber	36,5	102 000	0 358
Cotton	5,2(1)	15 000(2)	0 347
Livestock	5,2	1 324 000(3)	0 004
Citrus	4,5	2 600	1 731
Canned fruit	2,7	1 000	2 700(4)
Rice	0,9	1 100	0 818
Tobacco	0,2	575	0 348
Others	0,9	N/A	-

(1) Cotton figures in An. Stat. Bull. 1974 suggest a provisional E1,1 million.

(2) Estimates

(3) Including SNL cropland = 1,43 million ha.

(4) Distorted due to canning operation of citrus.

Major crops for internal consumption

All major export crops listed in Table 5 account for 34 700 ha or 61 per cent of ITF land. Further recorded crops contributing 9 370 ha (Table 6) utilised ITF area raising total land usage to 78 per cent. The remaining 12 450 ha is undeveloped or fallow and probably offers little scope for substantially contributing to increased food crop yields. Nevertheless existing yields are often not exciting and leave room for considerable improvement.

Of the estimated cropland available in the SNL sector over 85 per cent is said to be under production. Only 2 300 ha comes into the range of exportable crops or a mere 2,25 per cent. It is within this area that the greatest potential for increased production would appear to lie. The areas and production of crops for 1974 are shown in Table 7.

TABLE 6 Swaziland: Major crops on ITF land produced mainly for internal consumption

Crop	Area ha	Yield kg/ha	Note
Maize	6 900	1 255	
Beans	350	585	
Sorghum	145	1 665	
Potatoes	450	12 770	
Wheat	390	2 935	A proportion
Tomatoes	50	17 000	likely to
Other vegetables	120	N/A	have been
Nuts and fruits	950	N/A	exported

TABLE 7 Swaziland: Major crops on SNL produced mainly for internal (national and subsistence) consumption

Crop	Area ha (1)	Quantity produced m ton (1)	Yield kg/ha	Notes
Maize	68 850	108 575	1 575	
Groundnuts	5 200	2 790	535	(kernels)
Jugo beans	1 495	1 300	870	
Sorghum	2 716	2 330	860	(for local beer)
Beans	1 438	775	540	
Sweet potatoes	946	7 013	7 410	
Others	(100)	N/A	—	(Veg + potatoes)

(1) Figures based on sample survey of SNL 1973–74.

Fertilizer usage

During the last 12 years

Swaziland is a member of the Southern African Customs Union and as such no record has been kept of fertilizer entering the country except that entered in the books of a single trading organisation. However, since the installation of a bulk-blending plant by this company in 1970 little more than five per cent is estimated to be unrecorded.

Estimated consumption of N, P and K in selected years and total tonnages of all fertilizer is given in Table 8.

There is now emerging a clear rising trend in usage. Fluctuation in total consumption is due in part to climatic considerations and periodic shortages (1973–74). However, the increasing usage appears to result from increased intensity of application in the ITF lands rather than the SNL area where demand for fertilizer is only now being generated. This generation of demand is mainly being stimulated in the Rural Development Project areas and those other areas within the sphere of influence of the Central Co-operative Union. Even so sales are not expected to exceed 3 500 tonnes in 1976–77. This figure fits fairly well with the estimated tonnage calculated in the SNL sample census of 1973–74 of 3 700 tonnes. On the other hand 22 700 tonnes was calculated to have been used on ITF lands in the same year. The combined census totals in fact come to a 10 per cent discrepancy between usage and recorded sales but this could be ascribed to sampling error.

If the total N, P and K consumption figures are divided by the gross tonnage an average composition is obtained (Table 9).

TABLE 8 Swaziland: Estimated fertilizer usage and NPK estimates since 1963–64

Year	Tonnes of			Tonnes gross	Comment
	N	P	K		
1963–64	2 068	847	614	14 000	
1964–65				7 000	dry season
1965–66				15 000	
1966–67				17 000	
1967–68	3 136	935	681	16 500	
1968–69				N/A	dry season
1969–70				13 000	dry season
1970–71				17 000	
1971–72	3 700	1 117	1 560	21 000	
1972–73	(3 215	2 396	1 661)	26 500(1)	
1973–74	(2 186	2 274	2 194)	24 000(1)	fertilizer shortage
1974–75	(5 519	2 840	3 035)	33 000(1)	
1975–76	4 405	1 808	2 697	29 250	late season

(1) Estimates from N, P₂O₅ and K₂O figures available, not wholly reliable.

(2) Provisional. Anhydrous ammonia not included (\pm 500 t).

TABLE 9 Swaziland: Average composition of fertilizers used (%)

Year	Nutrients			Total
	N	P	K	
1963–64	14,8	6,1	4,4	25,3
1967–68	19,0	5,7	4,1	28,8
1971–72	17,6	5,3	7,4	30,3
1975–76	15,0	6,2	9,2	30,4

It is noteworthy that during the eight years between 1968 and 1975 there has been little increase in the overall concentration of fertilizers but a modest swing to lower N and higher K usage is evident.

Two reasons are suggested, the first, perhaps illogically from the managerial viewpoint is the substantial price increases experienced in the last three seasons which make N a less-attractive nutrient, and secondly that both the sugar estates and cotton growers have been stepping up K usage after several years of under-application.

An analysis of the individual commercial fertilizer components used to make up total N, P and K usage proved spurious as recent trends have been almost entirely governed by availability rather than preference.

Regional and crop variations in fertilizer use

Few data are at present available on regional variations in the fertilization of different crops.

From the census of ITF holdings an estimate of the sales of different fertilizer types throughout Swaziland is possible. (Table 10).

TABLE 10 Swaziland: Sales of different fertilizer types to ITF holdings

Fertilizer	Year			
	tonnage		percentage	
	1970-71	1975-76	1970-71	1975-76
Mixtures and others	5 206	11 419	33,4	39,1
Ammonium sulphate	2 975	433	19,0	1,6
Superphosphates	2 299	4 050	14,7	13,9
Urea	2 284	4 683	14,6	16,0
Muriate of potash	1 275	214	8,1	0,1
Anhydrous ammonia	858	(500*)	5,5	—
Calcium ammonium nitrate	400	5 112	2,6	17,5
Potassium sulphate	180	405	1,2	1,5
Ammoniated supers	171	2 934	1,1	10,0
Total	15 648	29 250		

*Provisional, not included.

TABLE 11 Swaziland: Fertilizer usage by region

Regions	Gross tonnage		Average rate of application kg/ha	
			1970-71	1973-74
	1970-71	1973-74	1970-71	1973-74
Highveld	725	631	138	191
Middleveld	3 936	5 941	240	485
Lowveld & Lubombo	10 986	16 217	306	298
	15 648	22 789	—	—

Table 12 Swaziland: Holdings on SNL using fertilizer by region

Region	Holdings using fertilizer as % of total number		kg used per ha
Highveld	45,4	or 18 714 ha	105
Middleveld	34,6	or 15 668 ha	161
Lowveld	4,4	or 1 683 ha	141
Lubombo	15,6	or 598 ha	45

A comparison of usage by region is provided in Table 11.

The substantial per hectare increase in the middleveld results from an intensification of usage on irrigated crops and pineapples. The dominance of the lowveld remains weighted by the citrus and sugarcane estates.

In the SNL the pattern of fertilizer usage is very different. Some fertilizer is estimated to be used (1970-71) on 34 per cent of holdings however there is an interesting regional variation in this proportion as shown in Table 12.

TABLE 13 Swaziland: Sale of different fertilizer types to SNL holdings, 1973-74

Fertilizer	Tonnage	Percentage
Mixtures	2 589	70,0
Superphosphates	844	22,8
Ammoniated phosphates	551	1,5
Ammonium sulphate	22	0,6
Urea	12	0,3
Lime	108	2,9
Others	66	1,8
Totals	3 696	100,0

This percentage variation is noteworthy if only because the pattern is almost exactly that of the recommended fertilizer requirements for dryland cropping, however the calculated per hectare usage reveals a very different picture. The high lowveld figure is probably due to application to cotton while the application rate in the middleveld is influenced by cotton, maize and tobacco.

Only preliminary figures are available to show the proportions and types of fertilizer used on SNL (Table 13). Periodic estimates by extension staff suggest an encouraging swing away from the traditional use of single superphosphate alone towards mixtures.

Single superphosphate remains the cheapest per bag fertilizer but, as yet unrealised amongst many farmers, is the most expensive in terms of unit cost per nutrient, and in terms of annual crops perhaps the least effective.

The limitations of time in presenting this review do not allow a detailed summary of fertilizer requirement by individual crop. On ITF lands, with the exception of the highveld, the data (Table 11) suggest that application is approaching the recommended rates. On the other hand rates of application to crops on SNL are well below the optimum. This factor in conjunction with often indifferent agronomic management contributes to low average yields.

Discussion and possible future trends

Development plans

With the exception of lime there is no definite government policy on the development of fertilizer use, nor is it intended that there should be in the short term.

On ITF lands, where sugarcane and citrus dominate the cropped area, fertilizer programmes are regulated through the respective Association and Board. The trend in the pro-

duction of other crops is also towards a greater degree of sophistication in planning usage based on parameters of analysis, and past cropping history. There is still a long way to go in this direction although the proposed development of a complete soil and plant analysis laboratory will add impetus to the moves.

In contrast, development in the SNL is framed in terms of area, services and to a lesser extent commodities. The primary areas of concentration are seven Rural Development Areas, four of which are already at an advanced stage and will cover some 200 000 ha of cropland and grazing when fully developed. The principal commodities on which efforts to increase production are being focussed are maize, cotton and tobacco (which are designated key crops) and cattle for beef production.

Complementary to these developments and plans are the organisation of Co-operatives, marketing and credit.

A further major area of development is centred on the National Farms (Tibiyo Project) established on both SNL and purchased ITF lands. These are large-scale commercial agricultural projects being managed for the benefit of the nation.

Future trends

This input of physical infrastructures, finance and expertise is expected to help generate the need for more fertilizer. Taken to conclusion with 50 per cent of the available arable land in commercial, as opposed to subsistence production, the demand for fertilizer could rise from the present 30 000 tonnes per annum to in excess of 75 000 tonnes.

Such an increase will depend on the whole complex of social and agronomic challenges and is being currently threatened by escalating fertilizer costs.