

# A LOOK INTO THE FUTURE

C A JURGENS, Fedmis (Pty) Ltd

## Introduction

I am honoured in having been invited to address you today. I am conscious of the possibility that here may be sceptics among you who may hold the view that some of what I say is likely to be biased as a result of preconditioning and allegiance to the fertilizer industry, in the New Testament, St Matthew (7:15) we find the words "Beware of false prophets, which come to you in sheep's clothing, but inwardly they are ravening wolves".

If I am preconditioned it is because I hold an allegiance to the farmers of South Africa in trusting that what we have done in the fertilizer industry is in the interests of our country.

As this is, by coincidence, my last direct connection with the fertilizer industry, after an association of nearly twenty years, you can rest assured of my objectivity. In fact "Methinks I am a prophet new inspired" (Shakespeare, Richard II).

I have no pretence to being a prophet as I cannot predict the future acts and decisions of men who with a stroke of a pen can change the course of history. May I, however, ask of your indulgence to take cognition of the opinions, whether or not in conflict with your opinions, views, ideologies or philosophies, of your fellow men and colleagues.

## The past

During the course of the morning my friend and colleague in the fertilizer industry, Trevor Webb, addressed you on the Development of the Fertilizer Industry. An historian is a prophet in reverse (Friedrich von Schlegel — Anthenaum, 1 "Fragments").

Whilst Trevor Webb has reviewed the development of the fertilizer industry in the Republic, in order to set the scene for this paper, I intend giving you some glimpses of earlier references to the use of fertilizers in our country.

One of Jan van Riebeeck's first orders after his arrival in South Africa was a brief instruction to the Corporal — Marcus Robbeljert, stationed on Robben Island. This instruction bade him keep his sheep clean and in good condition and to clean out the stables two to three times a week, collecting the dung, greens and muck to be used in due course for manuring plots of ground.

In 1800 the first agricultural expert at the Cape, William Duckitt, comments on how he saw "a quantity of manure lying exposed to the atmosphere, on the whole not very desirable for a farm".

In 1855 Dr James William Stroud of Port Elizabeth won a prize for an essay awarded by the Committee of the South African International Exhibition under the heading "Agricultural Science has application to the conditions of the Colony".

Dr. Stroud wrote

"Manure is a plant food added to the soil to make good its deficiency in useful materials for plant life or to increase its natural store. All vegetable matter, including seaweed, may be spread over the ground, more especially on light, sandy soils and ploughed in as manure. Or it may

be mixed with earth, lime or sand, and suffered to decay as 'vegetable compost', which may be mixed with any soil. All animal waste, whether in bone or manure, mixed with vegetable compost constitute a valuable and reliable manure, ploughed into the soil. Crushed bones, for the phosphorus and lime they contain, form a priceless manure, though countless tons are scattered wholesale over the country and are disregarded. Dung from the sheep, from its very nature, is most rapid of action; dung from the farmyard, the stable, byre and sty, though each differs from the other in value as a manure — contain all mineral constituents as plants, as well as nitrogen, a more or less quantity, and, if ploughed into it, dissolves and so helps to pulverise the earth as to render the stiffest soils perfectly fit for the growth and nourishment of plants.

"The dung from fattening stock is always the richest and a full-grown animal's is always richer than that from young animals, for the reason that the former have only to supply daily waste, the superfluity being thrown off, while the latter have to increase in size in addition to supplying daily waste.

"This applies eminently to bone substances and nerve matter, lime and phosphorus, so that less valuable material is given off in their droppings.

"Every field contains a maximum of one or several nutritive substances. It is by the minimum that the crops are governed, be it lime, potash, nitrogen, phosphoric acid, magnesia or any other mineral constituent. The whole art of manuring consists of adding the needed constituents in the right quantity at the right time, and in such a way that it will be evenly distributed".

## The present

We now take the time machine from those early days to the year 1971. In 1971 we consumed the following quantities of fertilizers (in terms of plant food)

Nitrogen	as N	209 000	} — 423 000 tonnes
Phosphorus	as P	131 000	
Potassium	as N	83 000	

It is estimated that during the same year we consumed  $\pm 800\,000$  tonnes of agricultural lime.

The farming area of the Republic farmed by Whites is estimated at 106 million hectares, inclusive of natural veld and 1,5 million hectares of forest. Of this area, 12 million hectares are cultivated.

The climatic conditions for 1971/72 were favourable and very good crops are estimated, amongst which are the following

Maize	$\pm$	10 000 000 tonnes
Wheat	$\pm$	1 000 000 tonnes
Kaffircorn	$\pm$	580 000 tonnes
Sugar	$\pm$	1 850 000 tonnes

The food produced in the Republic is not all consumed locally, and surpluses are exported. See Table 1.

Table 1 Production and export of some crops — 1965/70  
(Agricultural Statistics 1971)

Crop	Mean figures (1965/66 - 1969/70)		
	Production (tons)	Export (tons)	% Export
Maize	4 982 500	1 595 120	32,0
Sugar	1 498 000	730 460	48,8
Deciduous fruit	1 288 000	185 028	14,4
Citrus	600 952	322 678	53,7
Groundnuts	210 400	48 350	23,0
Tobacco	31 800	9 734	30,6
Potatoes	496 400	10 220	2,1

As a rough guide we can say that we have been exporting about one-third of our crops. Accordingly, with two-thirds of our crop production we have been able to sustain our population of 20 000 000 (average 1965/70) which population has now grown to  $\pm$ 23 000 000.

The graph in Figure 1, drawn on one-cycle semi-logarithmic graph paper, clearly indicates that the rate of growth of fertilizer consumption in terms of plant food and the rate of growth of the gross value of agricultural products are almost complementary.

The rate of growth of the area under cultivation, although having increased, has increased at a considerably lower rate than the rate of growth of both fertilizers and of the gross value of crop production.

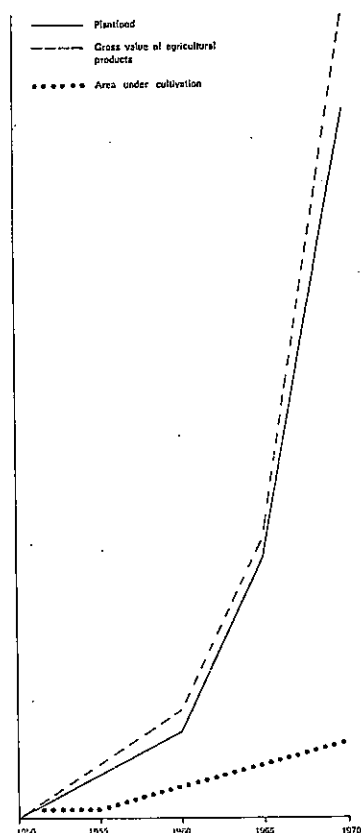


Fig 1 Fertilizer consumption and gross value of agricultural products

Table 2 Fertilizer applications in kg/ha agricultural land (excluding rough grazings)

	1955/1956			1967/1968		
	N	P	K	N	P	K
Netherlands	80	21,1	59,8	153	20,7	47,3
France	13	11,0	16,6	39	22,9	32,4
West Germany	33	14,5	49,0	69	26,0	67,2
Italy	16	11,4	2,5	29	12,8	9,1
United Kingdom	23	13,6	21,6	61	17,2	21,6
Republic of South Africa	3,6	8,0	2,5	1968 14,0	11,4	7,7
1965				1971 20,3	12,8	8,1

Table 2 sets out consumption figures of fertilizer applications in kg per ha on areas under the plough in a number of countries. Whilst climatic and other factors differ, it is interesting to note that the consumption of fertilizers in the older and maturer agricultural countries continues to increase. The figures relating to the Republic are interesting in so far as they show the same tendency as with those of the other countries listed on the table, in the considerable increase of nitrogen usage; the slowing-down of phosphorus growth and the levelling off of and, in some instances, a decline in potassium usage.

## The future

### Fertilizer potential

The foregoing figures all look very impressive, particularly when viewed against the past. Good, and in some instances, record crops were realised and the fertilizer industry recorded a substantial increase in fertilizer sales, particularly in nitrogen. Let us not be complacent. Let us examine these statistics in a little more detail.

The experts tell me that the quantity of fertilizer which should be used on twelve million hectares of ploughed land should be three times our present consumption of fertilizer, ie 1 275 000 tonnes of plant food as compared with the 423 000 tonnes we actually used in 1971. They further advise that we should be using about 4 000 000 tonnes of agricultural lime, ie twice the physical quantity of fertilizers sold in 1971. I believe that we will agree that, under present circumstances, these figures appear to be pure fantasy. However, on reflection, let us examine the pattern of fertilizer demand since 1949. (See Table 3.)

Table 3 Fertilizer consumption in tonnes NPK

1949 —	45 000	1961 —	158 000
1950 —	57 000	1962 —	180 000
1951 —	60 000	1963 —	223 000
1952 —	61 000	1964 —	254 000
1953 —	68 000	1965 —	256 000
1954 —	81 000	1966 —	253 000
1955 —	98 000	1967 —	309 000
1956 —	100 000	1968 —	340 000
1957 —	108 000	1969 —	342 000
1958 —	121 000	1970 —	355 000
1959 —	137 000	1971 —	423 000
1960 —	141 000		

By 1973, as compared with 1949, our fertilizer consumption would have increased tenfold, ie from 45 000 tonnes

plant food to over 450 000 tonnes plant food over 25 years. I can assure you that when I joined the fertilizer industry in 1952, with consumption of fertilizers having been 61 000 tonnes in 1951, by no stretch of imagination could I have projected the present consumption.

At a compounded growth of about 3,2 per cent per annum, based on the present fertilizer consumption, the consumption, in terms of plant food, of fertilizers in 25 years would be over 1 000 000 tonnes. Is this realistic?

I am reminded by what Edmund Burke said on the 22nd March, 1775, on the occasion of a speech on the conciliation with America, "You can never plan the future by the past".

We have limited available arable land. In the White areas we are presently ploughing 12 000 000 hectares. We have very little opportunity of increasing this area other than by new irrigation areas, which opportunities are somewhat limited. For purposes of this paper let us assume that the maximum area of available arable land is 15 000 000 hectares, ie 25 per cent more than the present area under the plough.

Our demographers advise us that by the turn of the century, at the present rate of growth of our population, the population of the Republic will have doubled from the present 23 000 000 to somewhere in the region of 46 000 000. Accordingly, on a limited area of land we shall have to produce more food to feed a growing population. To produce this additional food we must farm more efficiently. To do so farmers will have to employ the input factors to greater advantage, namely labour, machinery and equipment, seed, fertilizers and crop protection chemicals. The efficient and adequate use of chemical fertilizers is one of

the most important input factors which will contribute to increased yields, lower costs and higher profits to the farmer. Applied research as undertaken by the Department of Agricultural Technical Services, The Fertilizer Companies and Research Division of the Fertilizer Society has clearly demonstrated the considerable impact of fertilizers upon improving yields and profitability of farming. Table 4 sets out economic yields which have been achieved from applied research in the fertilizer industry.

Time does not permit me to delve into detail into the many factors which contribute to improved yields. What we do know, however, is that the new high-yielding cultivars frequently give no better results than the local varieties when not fertilized, but when fertilized, phenomenal results are achieved. Accordingly, we can expect that, as and when we develop new and better varieties adapted to our climate conditions, the usage of fertilizers will increase. In the USA it has been estimated that the increase in average maize yield from 1 900 kg/ha in 1939 to 3 500 kg/ha in 1961 was over a third due to improved varieties, 30 per cent to fertilizers and the remainder to changes in production location and improved technology. Based on a large number of trials and farmers' experience in different countries, it appears that under similar conditions of irrigation and fertilization a yield advantage over unimproved varieties of rice and wheat of up to 100 per cent can be achieved with high yield varieties, and up to 40 per cent in the case of maize. (ISMA, 1970.)

How much fertilizer should be used? The quantity of fertilizers which should be used should be sufficient, in the first instance, to build up the fertility status of the soil, and

TABLE 4 Achievable and actual yields in tonnes per hectare in the dryland White farming areas.

		Eastern Tvl	Western Tvl	Northern Tvl	North Eastern OFS	North Western OFS	Natal	Western Province	Republic average
Maize	Achievable*	6 - 8	4 - 6		4,5 - 6,5	5 - 7	8 - 10		
	Actual average**								
	1950	1,06	1,27		1,16				
	1960	1,69	1,80		1,38				1,70
	1970	2,65	1,90		2,65				
Wheat	Achievable		1,5 - 2		2,5 - 3	1,5 - 2	3,5 - 4	2,5 - 3,5	
	Actual average								
	1950							0,74	
	1960							0,95	0,74
	1970							1,16	
Potatoes	Achievable	2 - 2,5			1,5 - 2	1,5 - 2,5	3,5 - 4	2,5 - 3	
	Actual average								12
Kaffircorn	Achievable	4 - 6	4 - 6	3 - 4	4 - 6	4 - 5			1,91
	Actual average								

\* Achievable — relates to yields which are, and have been, economically achieved by good farmers, under normal climatic conditions in the dryland farming areas.

\*\* Actual average — as obtained from official statistics, where available.

in the second instance, at least sufficient to replace the plant food removed by the crop from the soil. Let us take an example to ascertain whether or not we are replacing the quantity of fertilizers which is removed from the soil.

In the current season, 1971/72, we expect a maize yield of  $\pm 10\,000\,000$  tonnes. The estimated quantity of chemical fertilizers used by maize farmers in 1971 was 200 000 tonnes plant food. According to Orchard (1964) the quantities of chemical fertilizers required to replace the plant nutrients removed from the soil after allowing for recovery factors on fertilizer, are 18,3 kg N, 10,8 kg P and 3,75 kg K per tonne of grain. Thus, based on these figures, we should have used 330 000 tonnes plant food to produce 10 000 000 tonnes of maize.

Based on these figures we have a discrepancy of 133 000 tonnes of plant food. Whilst it is appreciated that in practice many other factors should be taken into account in a calculation of this nature we can conclude that we are exploiting and depleting our soils. Can we continue to do so year after year?

As regards agricultural lime, the situation is even more critical than that of fertilizers. Unless the pH of the soil is corrected how can farmers expect to get optimum fertilizer responses?

This is possibly one of the biggest problems facing the fertilizer industry because the growth and development of the chemical fertilizer industry is bound by results and if the farmer does not get results he will not use fertilizers in adequate quantities. It is estimated that during 1971, 800 000 tonnes of agricultural lime were used by farmers whereas  $\pm 4\,000\,000$  tonnes should have been used. As regards the reasons for this large discrepancy it is frequently stated that the problem is inadequate rail transport, particularly on the Immerpan line, resulting in non-delivery and cancelled orders. A further factor is that our farmers are themselves at fault in not using sufficient lime. If there was a substantial and sustained demand, the authorities would have to provide the facilities to move the agricultural lime.

From the foregoing we can conclude that the chemical fertilizer potential is considerable in view of

- 1 Increasing population to be fed.
- 2 Limited arable land.
- 3 The need to produce food more economically.
- 4 The need to build up and maintain soil fertility.
- 5 The possible development of new varieties or cultivars.

I would like to make an attempt at quantifying fertilizer usage in the future as this is an entirely different problem. Our forecasts of the future are circumscribed "For we know in past, and we prophesy in past". (Corinthians 1—13:9.)

We, however, should take heed of past events and developments for if we plan well, having learnt from the past, we will be well rewarded. "You cannot fight against the future. Time is on our side". (W E Gladstone — Speech on the Reforms Bill, 1886.)

## Mobilising the potential

### Communicating knowledge

It is not for lack of scientific knowledge that our average performance in agriculture is unsatisfactory and lags behind other developed countries. (This is notwith-

standing the often used rationalisation that "our climatic conditions are unpredictable".) In respect of the latter it has been demonstrated by our agriculturists that by adaptation to our climatic conditions, we can produce far more, and more economically, if modern and efficient farming techniques are employed.

At a UNCSAT conference held during the early 60's one of the reporters, after mentioning the technical progress of the last quarter century, wrote in conclusion "There is no doubt that man now has the power to increase agricultural production immensely without having to wait for new discoveries simply by applying known methods, which can easily be adapted to climatic and soil conditions".

An expert in the field, H D Kay, reported in a recent study of the British Association for the Advancement of Science (1961) that in his opinion "... it is not shortage of basic scientific knowledge nor of sound and practical methods for applying it to agriculture or dietetics, that is the major obstacle to fairly speedy improvement of nutrition in most of the hungry countries ... it is rather the extreme slowness of implementation of knowledge ...".

The importance of the extension officer in the public and private sector cannot be over-stressed. These men, as with the salesmen of the fertilizer companies, are the link with the farmer in communicating knowledge. Let us not burden our extension officers unduly with unnecessary administrative work. Furthermore, no man can be an expert in everything, and accordingly I sympathise with the extension officers who are expected to be authorities in every field. It may well be in the interests of agriculture if the Department of Agriculture developed specialist groups of extension officers who would concentrate on one or other aspect of agriculture.

It is of interest to note some of the findings of a fertilizer company on a market survey conducted in 1967

- (a) Nearly two-thirds of the dryland farmers in the maize triangle received no visits from a departmental extension officer during the past year (1966);
- (b) Except for Natal, less than 15 per cent of the farmers received more than three visits from extension officers during 1966;
- (c) More than half of the dryland farmers in the Transvaal and Orange Free State did not receive a visit from a technical representative of a fertilizer company and less than 20 per cent received more than three visits during the year.

### Agricultural policy

Although not defined, but by interpretation of agricultural pricing policies and credit policy to farmers, as has been practised in the past, it appears that our agricultural policy has been framed to support the uneconomic farmer or farm unit. It has been reported that 40 per cent of the farmers produce 87 per cent of farm produce and 61 produce nearly 97 per cent, thus the remaining 40 per cent produce relatively little. (Financial Mail, 1972.)

It is hoped that as a result of the recommendations of the Du Plessis Commission on Agriculture, that the Government will have the foresight and courage to pronounce an agricultural policy for immediate implementation which will establish the base for the development of a sound agricultural sector.

It is not my intention to discuss the many facets which should be considered in establishing an agricultural policy but you will appreciate that the future of the chemical fertilizer industry is directly linked with the future of our agriculture. I accordingly ask of your indulgence if I may raise one aspect, namely that of fertilizer subsidies, which

can contribute, if established at adequate levels, to the well-being of our agriculture.

Fertilizers are subject to a central government subsidy. The object and purpose of the subsidy is to promote better farming through the use of fertilizers, which embraces the building up of our soil status. Subsidies are also paid on the end agricultural product. The prices of agricultural products cannot be set unrealistically. The demand for a product and the supply thereof always plays an important part, apart from the rise in production costs. Subsidies are one method often used to encourage the production of a particular product. There are two methods in which subsidies can be applied, namely

- (a) on the end product or
- (b) on one or more of the most important means of production.

The advantage of subsidising the end product is that it will be selectively applied on certain products and therefore make production more profitable whilst it also keeps the price of the product within the means of the consumers. A noticeable disadvantage of this method of subsidising is, however, that there is no encouragement to the farmer to produce more effectively.

A subsidy on the production of certain products has the advantage that it encourages the use of the product. Consequently the use of the particular products which have a large influence on effective production can be promoted.

During the year 1971 the amount of subsidy paid on fertilizers amounted to ±R16 000 000. The Government, however, have for the year 1972 reduced the fertilizer subsidy per unit of plant food and in effect reduced the gross amount Central Government will pay in respect of fertilizer subsidies.

I submit that this policy is short-sighted and that the fertilizer subsidy should be doubled and that subsidies on end products should be dispensed with or phased out. In this respect I quote from evidence submitted by the South African Agricultural Union to the Commission of Enquiry into Agriculture "The Government is already subsidising fertilizer on a plant nutrient content basis but the extent of the subsidy has not yet reached the levels payable, for instance, in Rhodesia and in Australia, and serious consideration ought to be given to a further increase to encourage a better level of fertilization. This would increase the yield per morgen and reduce the unit cost of, for instance, maize and wheat, with a possible reduction in the consumer subsidies paid by the Government for these products. This would be the case where the subsidy could be more effectively applied on the production side than on the consumer side".\* (See Appendix I for the history and extent of fertilizer subsidies.)

### Agricultural research

As regards agricultural research there has in the past, unfortunately, been conflict between the private sector and the Department of Agriculture. It should be appreciated that the private sector has a right to research their products in order to ascertain how best they can be used by their farmer customers and to communicate that knowledge to their customers. The private fertilizer companies, in respect of fertilizer, confine their research mainly to applied research and I can say with pride that they have done a grand job. The advent of the research unit at the Fertilizer

Society is an indication of the reality which prevails amongst the fertilizer companies of the benefits of working together in the interest of agriculture. Let us not be pre-occupied with prejudices and jealousies which preclude us from doing the job in hand. It augurs well for the future that the co-operation between the fertilizer industry and the Department of Agricultural Technical Services has never before been as good as it is now.

Unless we determine and implement a sound agricultural policy, communicate our knowledge to the farmers and continue our research in the direction of identified problems and the private and public sector work together harmoniously towards the common objective of improving the efficiency and well-being of our farmers, we will not achieve the fertilizer potential and our agricultural potential.

Protagonists may be alarmed in saying that we would produce a glut of food if what I have advocated comes to reality. This it not necessarily the case. I believe that in a situation of uncertain climatic conditions and with an increasing population, it is unwise to restrict efficient agricultural production. Notwithstanding the Green Revolution which is resulting in substantial increases in food production in countries where previously least expected, many billions of people are still living, and will continue to live, under conditions of malnutrition. There will always be a demand for food. Accordingly, we should be in a position to export food but let us produce more efficiently. This can be achieved if our agricultural policy is geared to efficient farming and not to average or below-average farming.

What I am advocating is the more economic production of food through more intensive agriculture on less land by using the right land for the right crop.

## The fertilizer industry

### Government policy

The future of the fertilizer industry is directly linked with the future of the agricultural sector. However, assuming that all I have said in the preceding paragraph materialises, then for the future of the fertilizer industry, clarification is required as to Government policy regarding the growth and development of the industry. It is a *sine-quo-non* that a healthy industry must be established on a sound base. The base is founded on determining either

- (a) a policy of domestic manufacture of the basic plant foods and the processing thereof to the finished products;
- or
- (b) a policy of free importations with the industry having to concentrate on those activities where it is competitive;
- or
- (c) a balance between (a) and (b).

The Republic's Government has elected to pursue a policy of domestic manufacture so as to ensure that fertilizers are always available. During the second world war fertilizers were in short supply and had to be rationed, with consequential effects of poor crops.

Furthermore, the development of a sound chemical fertilizer industry acts as a catalyst for the development of

---

\* Author's note — This is possibly an error, as I am unaware of subsidies being paid on fertilizers in Rhodesia.

other industries and ensures stable prices for fertilizers, which are, on world markets, prone to fluctuate widely in price and sometimes, as is the present position with phosphates, are virtually unavailable and, if available, at very high prices.

Assuming that our policy is that of promoting the development and growth of a viable fertilizer chemical industry then it is a *sine-quo-non* that the Government should implement a consistent policy for the achievement of this objective. The fertilizer industry is capital intensive. To attract capital then there should be a stable economic climate and a stable policy for the promotion of the fertilizer chemical industry with adequate tariff protection and a sound return on capital employed.

As regards tariff protection and sound returns on capital employed, Terry Conroy has expounded on these matters. I, however, am obliged to take the courage of my convictions in hand and question as to how the industry can be expected to play the role expected of it when it is circumscribed as to import controls. Other members of our Customs Union are not and can import basic fertilizer plant food for final processing when such plant food production is in adequate supply, and then market those fertilizers in the Republic. Whilst I am a firm supporter of the Customs Union and in fact advocate an enlargement of it to a Southern African Common Market, I submit that the same rules must apply to all partners to the Customs Agreement.

If the production of such basic plant foods emanates from basic natural resources of the countries in question, then I have no quarrel. Accommodation by manipulation of tariffs and import control can only make a mockery of economic policy, which is founded on encouraging and promoting the full use of the natural resources of all members of the Customs Union. We acknowledge that economy of scale is a major factor in the cost structure of the production of fertilizers. As compared with the developed nations our demand for fertilizers is, at present, relatively small. This factor mitigates against the proliferation of fertilizer producers. Under these circumstances, although in conflict with the philosophy of free enterprise, we are obliged to recognize and condone quasi-monopolies and oligopolies. The adage "What is good for the country must be good for us" applies under the forementioned circumstances.

Capital is a scarce commodity in a country which has so many calls upon its capital and we cannot allow capital to be unwisely invested in creating unnecessary capacity particularly as the likelihood of profitable exports of fertilizers on a mass scale are questionable. As we grow of age and our agricultural economy matures with increasing quantities of fertilizers being used, then we may well be in a position to allow the fertilizer industry to develop without Government intervention. Whilst I do not advocate Government control of the development of the industry, I do advocate Government guidance and moral suasion as to the number of plants and phasing-in of the large basic fertilizer plants, eg phosphoric acid, ammonia, etc.

I have referred mainly to the manufacture of the basic fertilizer plant foods. The same argument applies to the downstream units, eg nitric acid, limestone ammonium nitrate, urea, triple superphosphates, etc.

In submitting these views I recognise that I am exposing myself to attack from protagonists of free enterprise. May I put you at ease? I am a firm believer in free enterprise, but one must be realistic and practical. I wonder how many industries in South Africa could have developed against imported goods, frequently dumped, without official or

tacit Governmental support for monopolistic or near-monopolistic conditions?

## New developments

I do believe that there are facets of the fertilizer industry which can and are being done as efficiently and sometimes more efficiently by the small operator as compared with the giants.

In this respect I do not profess to know whether or not we are as yet ready for these developments which are basically confined to the latter processes of fertilizer mixing and blending and the distribution of fertilizer from the factory to the soil.

The fertilizer industry, as with all other industries, is obliged in this age of innovation and change to keep abreast of changes in technology of manufacture and distribution so as to ensure that the customer gets quality, gets what he wants, when he wants it and gets it at the lowest price delivered to his farm. Under present economic circumstances, as applicable to the Republic, it appears that the most economic means of providing fertilizer to the farmer is to produce the basic plant foods and downstream fertilizers in solid form at large plants for direct distribution to the farmer. This policy avoids the costs of double handling and the attributable costs of middlemen. In fact, our farmers are purchasing their fertilizers at wholesale prices.

Changes to the present system of distribution will come about due to the following factors, namely

- 1 Intensive fertilizer usage.
- 2 Shortage of unskilled labour.
- 3 Problems of moving fertilizers seasonably.

We have, in all probability, read about fertilizer slurries, bulk blending, pressure solutions, non-pressure solutions and the delivery of fertilizers in bulk for direct distribution by a contractor, on the soil. These are the developments I earlier referred to. I believe that they will come about if their economics are right, if all or some of the aforementioned factors come about. A word of caution. These processes and techniques often call for special skills, and whilst ostensibly offering advantages also have disadvantages. Furthermore, they are not generally applied in all developed agricultural nations, their application depending upon the economic circumstances, agricultural distribution system, railage distances, the structure of the fertilizer industry and the economic policy of the countries in question, in fact, there is only one country which has introduced these methods on a large scale, namely the United States of America. The special circumstances which exist there do not necessarily apply here. It is interesting to note that these techniques of production and distribution have only recently been introduced in the United Kingdom and some countries of the EPTA countries, and then only on a modest scale.

As regards fertilizer processing technology, you can rest assured that the Republic's fertilizer industry is up to world standards and employs the most proven technical processes. You will appreciate that time does not permit to discuss matters such as eurification, nitrification, slow-release fertilizers, trace elements, micro-nutrients, trends in fertilizer concentration, etc.

Table 5 does give some indication, however, as to how we stand in relation to other countries in respect of concentration of our components.

TABLE 5 Concentration of fertilizer compounds

Country	Year	Conc. %	Year	Conc. %	Rate of Conc. increase %/year
United Kingdom	1957/58	31,1	1966/67	40,4	1,03
Japan	1960/61	27	1967/68	37	1,43
	1957/58	29,2	1966/67	35,3	0,67
United States	1957/58	30,2	1967/68	38,1	0,79
Republic of South Africa	1957	24,9	1968	35,8	0,99

The industry is conscious of its responsibility for protection of its economy and spends a considerable sum of money on air and water pollution treatment plants. The enterprise shown by one of the fertilizer companies in constructing a plant to produce cement from waste-gypsum from its phosphoric acid plant, a first in the world, is a demonstration of the concern the industry has for environmental control.

### Bantu agriculture

In this paper all figures quoted have excluded those of Bantu agriculture. It is not because of oversight that I have not previously referred to the state of our Bantu agriculture, it is because it is extremely difficult to obtain any meaningful statistics.

By modern-day standards, our Bantu agriculture is poor and virtually non-existent. Whereas our White agriculture is at the take-off period, our Bantu agriculture is as yet at the subsistence level.

I estimate that the consumption of fertilizers in the Bantu Homelands at being not more than 3 000 tonnes plant food. The average maize yield in the Transkei is no more than 0,5 tonnes per hectare and the total production of the Bantu Homelands is not more than 500 000 tonnes, whereas I am advised that the potential in the Transkei, for maize production, is 6 000 000 tonnes.

I understand that there are 700 Bantu extension officers in the Transkei. It is recognised that the task of promoting modern agricultural practices amongst the Bantu is extremely difficult. However, we must be patient and persistent. At the FAO World Food Congress held at The Hague in 1969 I was impressed to hear of progress being made by other countries in the promotion of modern agricultural practices amongst their developing populations.

The chemical fertilizer potential of the Bantu Homelands is considerable, but I would be indeed surprised if we were to achieve 10 per cent of it in the next twenty-five years, if past trends are of any indication. Some ten years ago the consumption was of the order of  $\pm 1$  800 tonnes as against  $\pm 3$  000 tonnes today.

The contribution of the fertilizer industry in promoting Bantu agriculture is very modest and is mainly confined to educational material developed and supplied by the Fertilizer Society. We are aware of what contribution we can make but we are not certain what role is expected of us from the authorities.

### Conclusion

The growth in demand for chemical fertilizer over the last twenty-five years, on the surface, appears to be more than satisfactory, but when viewed against the latent potential, factors of economic food production, depletion of the soil, etc, it is apparent that we have a long way to go. The need for urgent attention for the adequate use of agricultural lime is stressed.

The future of the chemical fertilizer industry is directly linked with the future of the agricultural industry. The formulation and implementation of an Agricultural Policy on the basis recommended by the Du Plessis Commission is vitally necessary for the establishment of our agriculture on sound economic grounds.

The Government should appreciate that the chemical fertilizer industry cannot be expected to play its true and vital role unless the economic well-being of the industry is assured. In this connection, matters of uncertainty such as the implications of the Common Customs Union upon the consistent application of Government Economic Policy is of vital importance, for the industry cannot operate within an economic environment of uncertainty.

At its present stage of growth it would appear that, in view of the limited market, and the impact of economy of scale that the phasing-in of major fertilizer plants should be regulated by the Government.

As regards new innovations, basically in marketing and the distribution of fertilizers it would appear that our economic situation mitigates against such developments in so far as our farming is as yet not intensive as regards the use of fertilizer and that unskilled labour is available at rates of pay which do not make it attractive to seek alternatives.

The use of fertilizers needs stimulation through increased fertilizer subsidies. It is suggested that the subsidisation of the important input factors is more important for efficient agriculture than the subsidisation of the output.

The growth and development of Bantu agriculture has been disappointing. The potential is there, but unless considerable changes take place their potential will remain an academic exercise.

The practical realisation of our agriculture and fertilizer potential is fraught with many problems. Given the right direction and support I am confident that our farmers will come up to the mark and I can assure you that your fertilizer industry will produce the goods.

On the other hand, let us not, as an industry, because of optimistic forecasts of fertilizer potential, now engage upon an irrational programme of expansion of capacity. Let us learn from the mistakes of others who, particularly in the United States, expanded production capacity at an alarming rate on forecasts of fertilizer consumption based on potential. Reality should prevail in so far as potential is rarely, if ever, achieved.

### Fertilizer subsidy

#### History

With the standardisation of the range of fertilizers offered for sale, introduced in 1941, it became possible for the Government to offer a subsidy to encourage the use of fertilizers. This subsidy, amounting to R2 per ton, was effective from 1st January, 1942.

Prior to this, in 1939, the Government extended the railrage rebate to include fertilizers and certain other farm requisites. This railrage rebate had been introduced earlier

in the 1930's on agricultural products as a means of assisting agriculture. The amount of the rebate varied from time to time, but remained at a level of 75 per cent for a considerable period prior to the substitution of both the R2 per ton subsidy and the railage rebate by a consolidated subsidy in 1965.

### Consolidated subsidy

The form of subsidy applicable up until 1964, namely the subsidy of R2 per ton plus the railage rebate, although assisting tremendously as a stimulant to good farming, also had a detrimental effect on the usage of the correct fertilizer. This resulted from the subsidy being fixed at a constant per ton figure for all forms of fertilizer, thus discouraging the use of higher grade or more sophisticated forms of fertilizers. This fact was recognised and in 1965 both the old subsidy and the railage rebate were replaced by a consolidated subsidy based on the plant food content of fertilizers.

The new consolidated subsidy was designed to equal in total the amount of the two old forms of subsidy on the existing volume of economically sited fertilizer plants and generally placing the industry on a more logical economic basis in so far as transport costs are concerned.

Details of the consolidated subsidy are as follows

		Subsidy (in rand) per metric ton of plant food			
		1965/67	1968/69	1970/71	1972
Nitrogen	(N)	22,05	27,56	26,46	21,50
Citric-soluble phosphorus	(P)	49,60	73,04	67,24	54,00
Potassium	(K)	8,818	8,818	6,40	5,50

The effect of the foregoing subsidies as they affect certain popular fertilizers are illustrated as follows

		Rand per tonne product			
2.3.2 (26)		17,82	10,84	9,93	8,02
Single super-phosphate 8.32% P	4,03	6,06	5,58	4,48	
Urea 46% N	10,14	12,78	12,17	9,89	
LAN 26% N	5,73	7,17	6,88	5,59	

### References

- International Superphosphate Manufacturers Association, 1970. Fertilizers and High Yielding Varieties, Second World Food Congress, London, June, 1970.
- Orchard E R, 1964. Maize Exports Give Food for Thought, Fmg in S.A.
- Blueprint for Farm Policy, Financial Mail, February 25 1972. Page 477.