

SOME FACTORS TO BE CONSIDERED IN THE POSSIBLE DIVERSIFICATION OF CROP HUSBANDRY IN THE CANE BELT

By J. WILSON

Occupying as it does, an area of over 600,000 acres, sugarcane constitutes a dominant feature of the coastal region of Natal and Zululand.

It is difficult at this stage to envisage that it has been any otherwise so established and permanent does it appear, yet in 1920 the acreage planted to cane was under 200,000 acres and in 1910 it was a mere 50,000 acres.

Many factors have, of course, contributed to the expansion of this industry to its present day proportions but one of the most significant is undoubtedly the adaptability of the crop to such a wide range of growing conditions and also the simplicity of its culture. Sugarcane is truly a "pioneering" crop for its expansion has been not so much at the expense of other crops but rather by the opening up of virgin land from indigenous bush and swamp. It is true to say, therefore, that in general sugarcane has excluded and not replaced other crops in the coastal belt. No other single crop has achieved anything like the status of sugarcane during the development of the region with the possible exception of tea, which in 1905 occupied some 4,500 acres at a time when sugarcane production was depressed and the acreage reduced to something like 30,000 acres.

The phenomenal development of recent years has been possible by improvement in crop husbandry, particularly the use of fertilizers, and also to a very significant degree which is possibly less widely appreciated, by the development of improved varieties better adapted to the local conditions.

The occupation and taming of the coastal belt with ever increasing areas under cane cultivation has in itself created new environments vastly different from the old. Wild bush which so frequently acts as a reservoir for pests and diseases of cultivated crops as well as vermin has been steadily eliminated leaving a cleaner and more wholesome environment where crops can flourish instead of struggling to survive.

It is against this background then that we must examine the present position in order to decide what can be done to further the development of the region.

It is clear that the great majority, if not all farmers, are geared completely to the production of cane, a crop with which they are familiar, have confidence in their ability to handle it, and which in itself is both adaptable and long-suffering!

It is also clear that for the majority, cane will continue to be the mainstay, the "bread and butter" crop, for at least the foreseeable future.

The first task therefore is to ensure that within the limits of quotas, every ton of cane for the mill is

produced as economically as possible without detriment to the basic asset of every farmer — his soil. To attempt to cut costs by indiscriminate reduction of fertilizer usage is *not* one way of achieving this objective. Unless adequate nutrients are provided to supply the basic needs of the crop, plant populations will be reduced by deaths from debility and disease, yields will decline, and no amount of fertilizer applied at a later stage will restore the crop to its full capacity. Replanting will thus become necessary at an earlier date and any initial savings on fertilizer costs thereby rapidly dissipated.

It is not sufficient therefore to produce cane cheaply — it must be produced efficiently as well. To reduce the cost of an operation is all very well but if the operation itself is unnecessary the efforts at saving are misplaced and wasted.

Increased efficiency must almost inevitably, in most instances, mean more intensive production which will in itself aggravate the problem of land utilization. This will be dealt with later. Many farmers are of course well up to date in their adoption of efficient methods of husbandry but there are many others who, with native conservatism, still persist in following practices which cannot help but impair efficiency and thereby reduce profitability.

Some of the more obvious points which should receive attention are growing the best varieties for the conditions prevailing on each farm, seed selection, crop hygiene, correct spacing, effective weed control, cultivation and correct fertilization.

So much for cane destined for the mill. What are the other possible outlets for cane, for if there are any, many farmers would more willingly turn to these than to another crop of unknown potential?

Many attempts have been and still are being made to find a satisfactory method of fattening stock on whole cane or on cane tops, suitably supplemented with various concentrates, molasses, etc. Although some successes have been claimed it seems that most feeds end up with a lot of brought-in ingredients and very little cane! Further unless the farmer is familiar with stock and is aware of the pitfalls of management, profit can all too quickly turn to loss and on a substantial scale, for the initial capital outlay in buying in is not inconsiderable.

The possibilities of milling of cane to produce not pure sugar but some form of stock feed has many attractions for the absorption of cane surplus to requirements for sugar manufacture. The process in itself raises many problems and, of course, there is the additional problem of disposal of the products.

It is here that we depart from the familiar routine of cane growing and sugar manufacture into the realms of uncertainty, into unfamiliar products and problematic markets. It is here that we should pause a while to do some intensive and comprehensive marketing research before we start branching out into new developments which may be doomed to failure before they are born, through restricted outlets. It is not sufficient to confine the survey to internal markets alone for this could be unnecessarily restrictive and lead to an entirely false appreciation of the true developmental potential. Marketing research should cover the world field and take cognizance of possible changes in the supply and market position of those commodities grown in countries with uncertain political and economic futures.

There is some urgency attached to this if developments already in embryo are to be guided along the right lines. Since much of the information could well be already available from Government sources and since any new project would presumably proceed more smoothly with Government's blessing, there is good reason for close liaison and co-operation with appropriate Government Departments from the outset.

The climate and soils of Natal are such that a very wide range of crops will grow and flourish provided due attention is paid to siting them in the positions best suited to them.

It should be remembered however, that unlike cane which is grown for its vegetative parts many other crops are grown for seed or other end-products of flowering. The growing of such crops demands an understanding of the conditions most suited for optimum fruiting as distinct from optimum vegetative growth — and the two are very often very different. This perhaps applies more particularly to those crops which have precise day-length requirements for the initiation of flowering.

To those used to the adaptability of cane, its capacity to produce worthwhile yields on shallow soils, on beach sands, on hill tops, slopes, and in valley bottoms, in dry season and in wet, it cannot be stressed too strongly that few if any of the other crops which can be grown here will tolerate anything but small variations from the normal conditions required by that crop, if economic returns are to be obtained.

It is here therefore that yet another new concept must be introduced into our thinking — namely that of farm planning. While the temptation will undoubtedly be strong to put the best land under cane and relegate any other crops to the less good it must be remembered that it will be the overall productivity of the whole farm which determines its profitability. Thus it may well be much more profitable to grow cane with extra fertilizer on the somewhat poorer lands rather than some other crop less tolerant of the poorer soils and which will show greatly enhanced responses to being grown on better soils. This naturally applies particularly to the high value crops. It is also possible that in order to save expenditure on conservation works, ridging, etc., the steeper sloping lands should be assigned to cane rather than to more

erosion prone annual crops. Rotation of annual crops must be practised in accordance with the rules of good husbandry.

In other words it is necessary to integrate all crops into balanced farming system rather than to give V.I.P. treatment to one at the expense — and detriment — of the rest.

If farm planning be accepted as a sound working principle, it will then be appreciated that facilities for irrigation which permit the greater control of crop growth should be developed to the maximum as soon as possible wherever practicable. The elimination or alleviation of the undesirable effects of erratic rainfall distribution is probably even more important in annual crops than in perennials like cane.

The selection of the particular crop or crops to be grown will be determined by many local factors. Excluding the human factor and its attendant financial considerations the choice should be based upon the requirements of that crop. It is possibly easier to ascertain the limits of production for a crop by defining the conditions it will not tolerate. Thus cotton which requires plenty of root room will not tolerate shallow soils nor soils with high water-table. Coffee will not stand frost and will never bear satisfactory crops if exposed to persistent winds. Jute will not stand excessive variations in soil moisture and hence requires moist deep uniform soil conditions. Pyrethrum will not stand a combination of high temperatures and high humidity, etc., etc.

As has already been indicated the list of crops which can be grown is quite a long one. Many crops have indeed been grown on a small scale by individual farmers throughout the cane belt and there is no doubt that collectively, there is a considerable wealth of experience to call upon. Unfortunately most of the methods employed in the cultivation of these crops have often been purely empirical and doubtless do less than justice to the true potential of the crops in question.

If there is to be any large scale development it seems highly desirable that it should be brought about in an organized methodical manner. While it can safely be left to the individual to grow speculative crops such as vegetables and various perishable fruits which do not lend themselves to planned production nor organized marketing, other less perishable crops the production of which can be undertaken on a much larger commercial scale would undoubtedly benefit on all counts if they were developed on an industrial, group, or co-operative basis, in much the same way as our present sugar production is run.

The advantages of well organized production control and organized marketing require no comment here.

One question which inevitably arises however, is how best to grow these new crops. By our "closed-shop" development of sugarcane agriculture in the cane belt we have denied ourselves of the facilities of first hand information on the production of other crops in the region.

Since the climatic conditions prevailing in the region are unique in South Africa such information is not available from other sources within the Republic. In the circumstances it is perhaps understandable but nevertheless regrettable that farmers left to their own resources should turn to unqualified informants for the information they seek. Such information, sometimes based upon practical experience the value of which is often suspect and rarely substantiated or verified rarely incorporates the more recent recommendations of the agricultural research organizations of the territories where the experience has been gained. It is even worse when we find commercial travellers and salesmen, ginnery managers and industrial engineering representatives telling farmers what to do.

With new crops it cannot surely be necessary to start right at the beginning again and make all the same mistakes that have been made before. Here then is yet another matter to be tackled urgently, viz. to mobilize all the latest information on the crops selected from the research organizations dealing with them in countries where they are at present grown commercially. Such information will not be obtained from a commercial grower of that crop, unless he is indeed a very exceptional man. He will be at least five if not ten or more years behind in the practical application of the latest results of research. Let us therefore by-pass him, incorporate the very latest methods wherever possible even if at first sight they do sound rather more complex and time consuming. It goes without saying that whatever crop is selected only sound seed from reliable sources of the varieties required should be grown. The dangers of indiscriminate use of cheap seed from unregistered sources are great not only from the point of view of introduction of diseases and pests but also from the dangers of introducing exotic weeds.

Finally — the human element.

Any cane farmer who has convinced himself that he needs to diversify his production will, with the proper lead and adequate advice, grow another crop successfully and profitably. Any farmer who remains unconvinced of his need to diversify will almost certainly not grow another crop successfully because he does not really see the necessity to do so. Unless the farmer is interested and has the will to make a success of it, no crop, not even long suffering sugarcane, can hope to survive let alone produce economic and profitable yields.

After the reading of the paper Mr. Wilson showed slides of the growing of alternate crops and Mr. Watson also showed slides and gave a short talk on the use of insecticides in cotton.

Mr. J. L. du Toit (President), in the chair, stated that the attention paid to the paper showed the great interest aroused in the sugar belt in the growing of alternate crops, and asked growers to cite their experiences with the new crops.

Mr. W. J. Hempson related that a meeting would be held in the Empangeni/Ntambanana area to con-

sider the formation of a Cotton Growers' Association to protect the producers' interests.

Mr. Dymond described his experience with cotton generally. His crop was very poor but he had planted late because of the late arrival of seed. However he had tried to correct for a zinc deficiency which was known to exist in his area.

The Chairman said it did not follow that Mr. Dymond's poor crop was not due to zinc deficiency as very few leaves had developed when his plants were sprayed and it was only the spray which fell on the leaves which could have any effect. With cane, spraying with zinc had an almost immediate effect, which, however, was not a lasting one. It was possible therefore with the small amount of zinc spray applied, the application had not been very effective. Mr. Dymond's experience pointed to something being wrong with the soil and this should be investigated further.

Mr. de Robillard said at Natal Estates they had cotton plants which were well grown, but in spite of being sprayed with insecticide, did not form bolls. He did not think this to be due to jassid attack as the leaves were normal and healthy.

Mr. Pearson thought the seed was at fault. Seed sold by one company was composed of a mixture of varieties. The Uppington strain was very prone to jassid attack, which did not occur so much with varieties with a hairy type of leaf.

Mr. Wyatt asked if it were possible to obtain a guaranteed supply of seed.

Mr. J. Wilson said seed was normally bought from ginneries. It could however be obtained from the Barberton Co-operative which was undoubtedly a more reliable source of seed. The best seed he knew was that of the variety Albar 637 from Rhodesia, but the Government did not approve of this being imported because it wished to concentrate on no more than one or two varieties in any one area. Albar was resistant to "black arm" disease, has a reasonable boll and was acceptable to the spinners.

Source of seed was most important and one of the functions of a co-operative, if it were formed, should be to investigate seed supply.

Mr. H. Schmidt asked the reason for applying a de-foliant to the cotton plant and also enquired the cost of using this.

Mr. J. Wilson replied that the de-foliant "Diquat" was applied to the Experiment Station crop because the cotton was still growing when it was desired to harvest. The use of the de-foliant made the lint more easily visible and consequently harvesting was easier.

Mr. Pearson said the expense of application was negligible; he thought the amount required was in the neighbourhood of one pound of "Diquot" per acre and this cost about R1. Within ten days of application all bolls formed were open.

Mr. Robarts related that he had found most of the lower bolls in his crop did not open properly and asked if the de-foliant would help.

Mr. J. Wilson replied he did not think the de-foliant would help, but considered the condition might be due to black arm or to excessive shading caused by very heavy growth.

Mr. Hulley asked if cotton would do well when planted close to the sea, especially on sandy soil.

Mr. J. Wilson replied that in the West Indies it was grown less than a mile from the sea. Damage might well be caused however by wind-blown sand rather than by salt in the air.

Mr. Pearson related that a cotton variety trial had been established at about $\frac{1}{2}$ mile from the sea and the cotton was doing well in spite of the drought.

Mr. W. Hempson stated that he did not use a planter but successfully used a reversible pony-plough and covered the hand dropped seed with a chain harrow.

Mr. J. Wilson stated that the seed coming from the ginneries still had fuzz attached. This could be charred off by concentrated sulphuric acid and then, provided the seed was quickly washed in water, one obtained a very clean seed which could be passed through a planter. Mr. Fisher had de-linted seed by means of a concrete mixer containing coarse sand, and others by dipping the seed in mud, thus providing an artificial skin. Hand sowing was quite satisfactory for a small acreage.

Mr. Grice related that by dipping seed as received in dung and mud the ordinary S.A. "Wonder" bean planter, with slight modification, could be used. A woman field-hand could thus prepare three bags of seed per day.

Mr. Hughes asked Mr. Pearson if the seed, the bolls of which he had demonstrated, had been treated for black arm.

Mr. Pearson replied that it had been so treated and the black arm, probably from the soil, appeared only when the bolls were about to burst. In reply to a question from Mr. Hempson, he thought the poor opening of the bolls he had experienced was caused by rain, which caused heavy growth and this shaded the lower bolls.

Mr. Grice asked if irregular fertilizer application might obviate the necessity of using a de-foliant.

Mr. J. Wilson replied that cotton should be fertilized according to its requirements. If the crop were starved it might be possible to dispense with a de-foliant in the resulting poor crop. Adequate, but carefully controlled, fertilization, even with the use of a de-foliant, would certainly pay handsomely.

Mr. Fisher asked if the de-foliant would affect the under-developed bolls.

Mr. Pearson replied that the small bolls would be affected. One had to estimate if the opening of these small bolls would be worth waiting for.

Dr. Shuker asked if heavy rains in June would affect the quality of the lint.

Mr. J. Wilson said cotton planted at Shaka's Kraal had had persistent rain upon it when the bolls were

fully opened, but on picking after it had dried, the lint, though a little dull, was still graded first grade.

A good stand of cotton could yield up to 3,000 lbs. per acre, but he thought it likely that most growers would reap between 1,000 lbs. and 1,500 lbs. per acre until they better understood the handling of the crop. Problems not now experienced would probably arise in the future and experts in cotton growing would probably then have to be consulted.

Mr. Watson in reply to Mr. Main said the jets used for spraying insecticide on cotton should work at a pressure of about 45 lbs. per square inch. The spray emerging should be almost mist-like, causing a swirling action which led to complete cover of the plant. He informed Mr. de Lange that he doubted that it was necessary to apply a miticide more than twice in a season because once the cotton started drying out a miticide was not needed.

Mr. Stewart said it appeared that red spider was a major pest and he thought this might be due to D.D.T. killing off the predators of this mite.

Mr. Watson replied that any good insecticide would have this result. The application of a good miticide would probably ensure freedom from the mite for about two months. Time of application was therefore important. The two miticides used in Rhodesia were obtainable here.

Mr. Fry asked about the control of American boll worm.

Mr. Watson in reply said that control of American boll worm was most important as it was a major pest. Little was known about its action in Natal and it would take about two years to find out this information. He suspected however that in time the red boll worm would prove to be even more devastating, and farmers were advised to study their fields to determine whether the red or the American boll worm was present, and to spray with the insecticide necessary to control whichever was present, D.D.T. for the American boll worm and Sevin for the red boll worm. It was exceptional to find both present at the same time. In Rhodesia the first two sprays were Sevin to control jassid and leaf eating worms, the next four were D.D.T., and up to the next six, Sevin again.

Mr. Wyatt asked if the American boll weevil was found in Rhodesia or Natal and Mr. Watson said it was not as yet found in Southern Africa.

Mr. Pearson asked if some attack attributed to fusarium was not in fact due to jassid.

Mr. Watson said the incidence of jassid in South Africa was particularly bad and discolouration of the stem was a means of determining if the damage was caused by jassid. He had seen some plants in a field of cotton which he thought was the irrigation variety, Bancroft, which tended to collapse under dry land conditions and this pointed to the necessity of using pure seed.

A field he had examined the previous day would yield about 1,800 lbs. of seed cotton per acre, but if

it had been a good variety it would have yielded over 2,000 lbs.

Mr. Fisher suggested that there should be some Government control to ensure one got one's own seed back from the ginnery.

Mr. Wilson said it was best to obtain seed from Barberton or the Grain Marketing Board of Rhodesia.

The Chairman considered that if cotton developed on a large scale in South Africa, pressure would be brought on the Department of Agriculture to control seed quality.

Mr. Watson in reply to Mr. Hughes said Barberton was proving most helpful, and also, Mr. Pearson would be able to provide information as to the insecticide strengths necessary for South African conditions. Even if one had to use 14 insecticide sprays and two miticide sprays, with the new prices for cotton, the cost of spraying at about R18 per acre was negligible. The sprayings enumerated, meant spraying up to the time of picking to control stainer.

Mr. Beningsfield related that he had sprayed 14 times and still had a lot of stainer, and the green bolls would be affected eventually by stainer. He had picked twice but most bolls were not yet opened.

Mr. Watson said that two major pickings should give the bulk of the crop and one had to assess if further picking was profitable and spraying therefore desirable.

Mr. J. Wilson stated that it was undesirable to plant in water-logged soil. In Natal cotton was a perennial and could be grown as a ratoon but this was undesirable at least for the time being because one could not control the build-up of stainers.

Mr. Grice considered that there was a possibility of cross-pollination between different varieties — some grown on dry land and some under irrigation. If irrigation were considered then one must endeavour to get the best return for the money spent. Seed locally grown gave a poor stand.

Mr. Watson stated that a report on this subject would probably be available from the Uppington Research Station about September this year, and in reply to Mr. Fry said the variety he favoured most was Acala and seed of this could be obtained from the Cotton Research Station at Gatooma, Southern Rhodesia.

Mr. Pearson related that experiments were now being carried out to find out when bolls could be considered mature.

Mr. B. Trevor Wilson asked Mr. Wilson if it would be possible to grow coffee in Natal without irrigation.

Mr. J. Wilson thought the best coffee would be grown under irrigation but coffee could still be produced without irrigation, except in the very low rainfall areas, provided one had a good soil depth, the right aspect, and so on. Jacaranda Coffee Research Station in Kenya, in the middle of the coffee growing

area, had a rainfall similar to ours.

Mr. Main asked how coffee would be affected by humidity, as was experienced in the Mist-belt and close to the coast.

Mr. J. Wilson said very good coffee was grown at Eshowe, in the heart of the Mist-belt, and also at Umhlali not less than a mile from the sea.

In reply to Mr. de Robillard he said that young coffee plants had to be shaded but permanent long-term shade was probably unnecessary.

Mr. Parker asked if coffee could be grown without irrigation in an area receiving only 30 inches of rain per year.

Mr. J. Wilson replied that this question was one in which we required expert information and advice. To begin with he thought coffee should be grown under the most favourable conditions until more experience showed how far one could deviate from the optimum conditions.

Mr. Fisher related that certain Eshowe and Entumeni growers wanted qualified advice on whether they had suitable areas on which to grow coffee. Labour was at the moment available for planting coffee, but when the cane season started this would not be so.

Mr. M. E. Nyenhaus (Regional Horticulturist) said he intended visiting Mr. Fisher's farm in a short while from now.

The Chairman said it was obvious that alternate crops had come to stay and planters were looking for guidance and research to aid them with these new crops.

Mr. J. G. Marais stated that, as Assistant Director of Research for the Agricultural Department, he gave the assurance that the Department was doing all it could to carry out research with a view to finding out as much as possible about these alternate crops. Extension Officers were available to give what advice could be given as far as present knowledge allowed.

The Chairman thanked Mr. Marais for his assurance and promise to help with advice.

Mr. J. Wilson related that marketing research was most important especially as far as coffee was concerned. There was a possibility that the local trade might refuse to take our superior Arabica coffee, preferring the cheaper Robusta variety. They might not be prepared to pay R240 per ton but actually we required R1,200 per ton if we could get it by producing the requisite quality of coffee. There was no reason why we should not compete with Kenya on the quality market and seek outlets outside our own country.

Mr. Main stated he had grown jute in India and so was at first very disappointed with his crop here, as it looked so poor. Apparently the trouble was low temperature and as soon as the temperature rose in December and January the crop went ahead amazingly and reached about 12 to 14 feet high. It seemed

therefore that we had conditions in places in this country suitable for very successful growing of jute. Incidentally he had found the Gold Coast variety was not as good as the British Guiana variety and considered that more work should be done on selection of seed. He went on to say that at times it was difficult to get into a field of jute because the growth was too dense and he thought some sort of fog insecticide should be used under such conditions.

Could Mr. Watson advise whether a suitable fog insecticide was available?

Mr. Watson said that the largest air freight of insecticide was sent to Egypt last year and this consisted of the Sevin 85 formulation of very fine particle size which was used in fogging equipment.

Mr. J. R. Drummond asked for information on the cost of establishing the alternate crops suggested.

Mr. J. Wilson said that a total cost figure he had obtained for growing cotton from one grower was over R40 per acre. He thought this rather high and an estimate of R30 per acre would be reasonable.

Coffee could cost up to R400 under difficult conditions, but in Rhodesia and Nyasaland the cost was considered to be between R200 and R240 per acre from the establishment of nurseries to first bearing.

In reply to Mr. Stewart, who asked for the yield figures for green jute, he said that as yet the jute had been planted for seed and yield figures were not available.

Replying to Mr. Parker he said that at the rate of R30 per acre for cotton, the use of a Ferguson tractor for ploughing and harrowing would cost about R6, and spraying should cost about R10 per acre. In good land after a cane crop little fertilizer would be needed. A high percentage of first grade cotton might mean that one could afford to ignore the second grade cotton. Costs would obviously vary according to circumstances, but he considered R30 per acre could be regarded as a minimum overall cost.

The Chairman, replying to Mr. Dymond, said planters' Groups would have to decide as to whether the Sugar Experiment Station at Mount Edgecombe should continue to investigate problems connected with alternate crops.