

wagons so that the quality of the Agmark Products may be maintained. This would be especially true in the case of perishable articles like the potatoes, eggs, mangoes, sathukudi oranges and limes.

D. Future Programme: Development of Marketing in Madras State is imperative, if only to consolidate the gains accrued as a result of the greater production achieved through the various "grow more food schemes" in this State. Provision has been made in the third five year plan, for the expansion of the marketing section, providing for an Assistant Marketing Officer for each district, so as to be able to study the marketing problems and advocate the scientific marketing principles, for the solution of the same. With more production and better marketing amenities, the ryot in Madras State will have very few problems after the Third Five Year Plan and an era of peace and plenty is visualised.

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## Fodder Problem in India—a Suggested Solution

by

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A higher standard of living implies and includes a higher standard of nutrition. Improvement in the nutritional level needs an increase in the protein content of the food for which purpose animal proteins are more valuable.

In a predominantly vegetarian country most people will have to depend on milk and milk products as their only source of animal protein, especially for the more vulnerable group - growing children, nursing mothers and pregnant women.

A rapid increase in milk production for both rural and urban areas is not only desirable but imperative. Nutritionists have estimated that at best a 300 per cent increase in total milk production is necessary for India's requirements of milk and milk products.

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A whole host of experts like Sir John Russel, Dr. Norman Wright, Dr. K. C. Sen, have investigated all aspects of the problem. Their unanimous opinion has been :

(a) That the main reason for the very low milk yields of Indian cattle is they are maintained in a state of semi-starvation,

(b) Milk yields are absurdly too low when compared with the proved potentialities of many Indian breeds as milking animals,

(c) The 300 per cent increase in total milk output required by nutritionists could be provided without improving their potential milking capacity, if they are adequately fed and managed for two or three bovine generations. Better feeding and management will at the same time remove the other failings, viz., slow rate of growth, late maturity and long dry periods,

(d) Improved breeding without improved feeding is completely ineffectual and that, therefore, improved feeding must be given first priority over improved breeding.

**The Problem :** According to Sen and others (quoted by Whyte) an increase of 10 per cent in the acreage under fodder crops will suffice to meet the needs of the present cattle population. The problem is how the cultivator with 5 acres or less of cultivated land (with little or no grazing) can incorporate fodder production into his arable farming system.

**The Solution :** The writer, in seeking a solution to this very problem which faced him, reached the conclusion that the only solution lay in growing some dual purpose, grain-cum-fodder crop other than paddy. Paddy is ruled out because its straw is extremely poor fodder, its nutrition ratio being 1 in 40 or even less, the lowest nutritive ratio for raising milk yields being 1 in 10. To achieve this higher nutritive ratio a good legume hay should be fed along with the cereal straw.

The only way in which the needs of both man and animal can be integrated is by introducing quick growing dual or triple purpose fodder plants and legumes on arable land so that the farmer can use his crop in one form or other depending on seasonal needs or the current economic condition. There is no other solution to the problem.

**Choice of Species:** (a) *Legume:* First the legume hay is the most valuable fodder as its nutritional ration is 1:4. Cowpea hay is the best hay as it is superior in nutritive value even to soyabean or alfalfa. Cowpea also produces heavier yields of fodder in less time than any other legume. Certain varieties of lablab are also heavy producers of fodder. No information about its nutritive value is available to the writer who presumes that it cannot be much inferior to cowpea in this respect. An additional advantage is that by growing lablab varieties in addition to cowpea the growing season for green fodder can be prolonged. In the writer's opinion there is no other cowpea equal to the New Era for heavy yields of fodder as well as edible grain of high quality for human consumption.

The breeding work in the Pulses section at the Millet Research Station at Coimbatore has produced most impressive results especially in the breeding of improved bean varieties. Some of them are heavy producers of fodder and grain but the only disadvantage is their long duration. This has been corrected by further crossing and two such crosses which the writer saw in the field at his last visit to the Millet Station were reported to be great improvements. Though further improvement is possible and is being pursued, these three varieties will adequately meet the immediate need.

(b) *Cereal:* Sorghum is an obvious choice of all the cereals. It is the heaviest producer of both grain and straw. Over and above all these qualities it has the lowest water requirements and the greatest capacity to recover completely from short period of drought. The nutritive value of sorghum grain is higher than that of wheat.

The fundamental research work on Sorghum as well as the breeding of improved varieties carried on at the Millets Station of the Coimbatore Agricultural Research Institute has achieved international reputation. Nowhere else in the world has so much work of such immense value been done. Vastly improved varieties of grain sorghum have been evolved. But the improvement of fodder sorghum and grain-cum-fodder varieties falls far short of the standard reached in the improvement of grain sorghums.

The reason for this is not far to seek. The prime consideration for evaluating a forage species has been completely overlooked. This is not surprising as the Specialists and research

workers know little or nothing about livestock and livestock feeding. Livestock farmers place the greatest importance on the digestibility of the fodder. The higher the fibre content in a forage species the lower is the digestibility quotient. A stemmy grass like elephant grass is less valuable than a leafy grass like Guinea grass because the stems are less digestible than the leaves. The prime consideration, therefore, in evaluating a forage species is its leaf-stem ratio. The wider the ratio the better the variety from the livestock feeding view point.

As far as the writer's limited knowledge goes, the fodder sorghums commonly grown in Coimbatore as well as the newer varieties developed are all single stemmed, non-tillering, tall varieties. As one characteristic of sorghum is that the number of leaves is strictly limited the increase in height is simple due to elongation of the internodes. Thick sowing is the practice adopted for ensuring thin stems. How does this crowding of plants alter the leaf/stem ratio and size of the leaves? Effect on yield of grain only as a result of closer spacing is dealt with by Subramaniam *et. al* (1960).

**Ideal of a dual purpose sorghums :** To solve his own urgent fodder problem a very large number of sorghum varieties were tried over a period of several years by the writer on his farm. For evaluating, these, necessary characteristics of an ideal dual purpose sorghum were formulated.

1. Short duration - 120 to 130 days for grain.
2. Thin, sweet, juicy stems with wide leaf/stem ratio.
3. Free and uniform tillering.
4. Freedom from leaf and stem diseases.
5. Heavy yield of good quality, small, pearly grain with wide germ endosperm ratio.
6. Loose panicle not easily damaged by birds or caterpillars.
7. Good ratooning capacity.
8. Adaptability to a wide variety of soils and all seasons.

*Sorghum margaritifera* was found to approach nearest to this ideal except for its long duration (Table C). The next step therefore was to seek the help of a plant breeder. The whole problem was discussed fully with Dr. B. W. X. Ponnaiya who agreed

that this defect should and would be removed by crossing with some other varieties. The writer's suggestion that the most suitable variety for the other parent would be *grass shallu* or M. S. 8375 was acceptable. A beginning was made with *grass shallu* sorghum and some hybrid seed secured. The result from sowing the seed is eagerly awaited.

**Acknowledgment:** The writer owes an irrepayable debt of gratitude to Dr. B. W. X. Ponnaiya who from the very day of his assuming office as Millets Specialist has to this day evinced greatest interest in the writer's needs and helped him in every possible manner. The writer is equally indebted to Sri A. Subramaniam and his encyclopaedic knowledge of sorghum type collections of the Institute which enabled him to pick and strongly recommend *S. margaritifera* as the one variety most likely to meet the special traits demanded. Thanks are also due to Miss K. Meenakshi for the help she has rendered.

#### APPENDIX

##### A. Average analysis of whole cereal grains (Moisture free basis)

	Starch	Protein	Per cent		Germ	Bran
			Oil	Ash		
Sorghum (misc. var and kafir)	69.46	13.00	3.61	1.93	10.5	6.3
Wheat, White	66.90	9.90	1.96	1.84	2.0	13.2

##### B. Seeding value of Legume Hays

Kind of Hay	Mois- ture	Protein	Fat	N. free ext. Energy content	Ash	Fibre
Cowpea	10.4	16.1	3.2	40.3	10.2	19.8
Soyabean	8.4	15.9	3.9	38.8	8.9	24.1
Alfalfa	8.7	15.9	2.7	36.8	8.8	27.1

From USDA Farmers' Bulletin 1153 quoted by Allgren in "Forage Crops" 2nd edition, p. 151.

*Leaf/stem ratio and tillering of S. margaritifera*

No. of tillers including main stem	Five plants 3 months after transplanting					Total	Average per plant
	1	2	3	4	5		
	7	12	18	25	34	96	
Leaf weight 137.5 tolas Stem weight 103.0 „	} Leaf/stem ratio						1.33
(Author's Experimental Data)							

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## Importance of Periodic Renewal of Improved Cotton Seed

by

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In order to raise a good crop of a standard specification, it is very essential to grow an improved variety of the crop. It is well known that improved strains of cotton secure better returns from an acre to the grower than unselected bulk. The Madras Agricultural Department has recommended the following superior breeds of cotton for cultivation in the districts named against each.

American (Cambodia)	{	MCU. 1	... Madurai, Ramanathapuram and Tirunelveli.
		MCU. 2	... Madurai, Ramanathapuram, Tirunelveli, Salem, South Arcot and North Arcot.
		P. 216-F	... Tanjore, and Tiruchirapalli.

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