It will be seen that though there is no shedding with the shortening of the bristle, the obtrusive bristles have affected grain density in the earheads.

P. echinurus is said to be " bird-resistant, the bristles pricking the eyes of birds which attempt to extract the seed from the heads ";[4] and this has been the experience with this millet at the Millets Breeding Station, Coimbatore. Its chronic shedding, the long thick bristle and the associated vigour of the other minor bristles of the whorl and the consequent reduction in the number of grains (which is the all important end in view) militate against its spread as a cultivated variety, however desirable and helpful, the long bristle may be. It is, therefore, not surprising that through the selective forces of man exercised in the course of centuries the very short and suppressed-bristled and denser headed forms have formed the predominant group among the cultivated *Pennisetums*. Breeding to avoid the scaring of birds is thus beset with other economic disabilities.

Summary. Bristled earheads of *cumbu* help in preventing birds from pecking the grain. In the varieties studied, the longer the bristle, the greater the shedding of the fascicles and the lesser the density in the packing of the grain. The condition in which the bristles are suppressed in expression and remain below the grain surface is recessive to that in which the earheads show bristles of lengths from short to full.

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CATTLE IMPROVEMENT IN COIMBATORE DISTRICT

By D. G. MUNRO, B. Sc.

One of the quickest methods of improving cattle is to arrange for the supply of a sufficient number of high class bulls. These mated with good cows will further improve the stock and when mated to cows of poor quality and mixed parentage will grade up the stock considerably in a few generations. The improvement of stock is a long term process and consequently calls for well-laid plans which will be continued over a period of at least 15—20 years.

The problem of bull supply resolves itself into three major parts. Firstly, the supply of bulls, secondly the cost of purchase of bulls and their distribution and thirdly the maintenance of the bulls during the years when they are at stud.

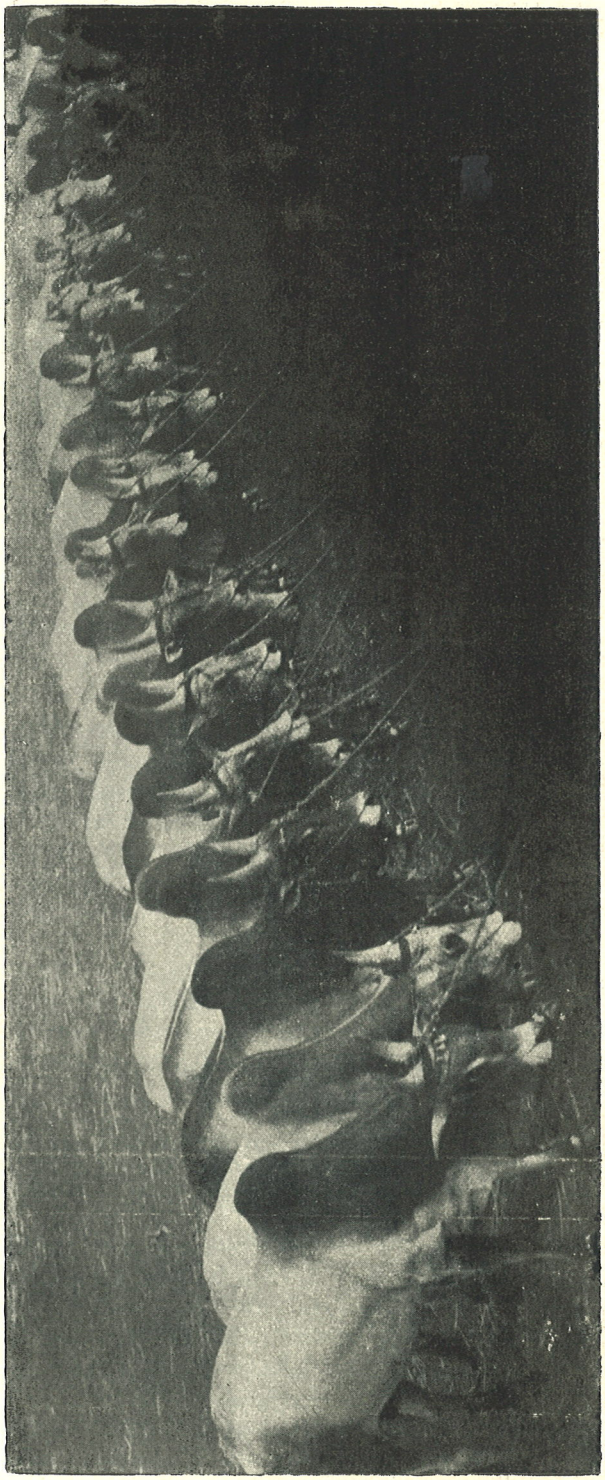
Supply of Bulls. Coimbatore district is fortunate in that it possesses a suitable and hardy breed of cattle—Kangayam—and a master in the art of breeding in the Pattagar of Palayakottai.

There is therefore a nucleus bull supply of at least 100—200 per annum, but is this sufficient? In Coimbatore and Salem districts alone, there are nearly 1,000,000 breeding cows. At 100 cows per bull, 10,000 bulls are required for these two districts alone mostly Kangayam and partly Mysore breed. On this basis, no further arguments need be given for the necessity to increase the supply of high class stud bulls.

Purchase of Bulls. The business of producing and rearing high class stud bulls is a costly one. All cows do not give the same quality calves and only the best of the bull calves in a herd are kept for stud bulls. The remainder are castrated for work bullocks. It has been argued that as good cart bulls can be purchased for Rs. 150—Rs. 300 per pair, stud bulls should not cost Rs. 150 to Rs. 300 each. Every man however expects the best price for the best animal and as the stud bulls are the pick of the season's calves, they should naturally be higher priced. If a bull performs 50 services per annum for 3 years = 150 services, let us take 120 calves as the result. A good bull will easily increase the value of each calf by Rs. 5 to Rs. 15 or an average of Rs. 10. The resulting increase in livestock wealth on this calculation is Rs. 1200 or 4 times the value of a Rs. 300 purchase price. The bull is still fit for further service or he may be castrated and used as a work animal. In evaluating a stud bull therefore, it should be borne in mind that not only is the animal itself being purchased, but also the increased value of the calves produced by it and a normally Rs. 300 bull is in the long run cheaper than a Rs. 100 bull.

Maintenance. The cost of maintaining a bull for a year varies with the locality. Where all fodder and concentrated foods are purchased in the market and a special attendant paid for, the cost is very high. Where the bull is maintained by a ryot producing his own fodder and his cattle attendant gives part time attention to the breeding bull, the cost may go down to Rs. 10 to Rs. 12 per mensem. When the District Board, Coimbatore paid maintenance charges, the cost went as high as Rs. 22—8—0 per mensem or Rs. 270 per annum, roughly the value of the bull himself.

Service fees are charged at rates varying from annas four to rupee one and considerable difficulty has been met in persuading ryots that any service fee at all should be paid. This presumably is the result of the Brahmini bull free service scheme in existence in former days. Bull schemes organised on more materialistic lines however demand that those who receive the benefit i. e., the ryots whose cows produce better calves, should contribute to the cost of maintenance and the most equitable manner of distributing such costs is by the levy of a service fee. If a bull does 50 services and the cost of maintenance is Rs. 150 per annum, to meet the maintenance charges alone, Rs. 3 as service fee is required. In Mysore in the Hallikar breeding tracts, a service fee of Rs. 2 to Rs. 5 is willingly paid by the ryots.



Government and District Board Schemes. About 10 years ago, the Agricultural Department introduced the premium scheme for breeding bulls whereby for a stated number of services a premium of Rs. 100 each would be paid annually towards the cost of maintenance of the bulls. 3 bulls were started in 1928 with Co-operative societies. Leaflet No. 2 of the Department of Agriculture gives information in regard to this scheme. The District Board also purchased some bulls and put them out with individuals and paid maintenance charges. An examination of the results in 1933—34 led to the conclusion that instead of paying maintenance charges or premia, it would be advisable to spend the money available annually in the purchase of bulls. These bulls are placed out with land-lords and ryots, who undertake to maintain them at their own cost as breeding bulls for 2 years and do 50—60 services per annum. At the end of two years, the animals then become their own property. The bulls are inspected and reported on quarterly by members of the Agricultural and Veterinary Departments and any defects in the bulls or their manner of maintenance are reported. The main difference between these schemes is that in one case the subsidy is paid as a premium towards maintenance charges and in the other case, the available money is spent in the purchase of bulls. One great advantage of this latter method is that at the time of purchase the bulls are selected by experts and a high standard of quality is ensured. The scheme is working satisfactorily and no difficulty is now found in getting men to take the responsibility in regard to their maintenance and carry out the necessary conditions. There are now 45 bulls (1935—36 = 22 and 1936—37 = 23), included in this scheme and 19 bulls under the Government premium scheme, 7 of which are maintained by Co-operative societies and the remainder by private individuals.

When propaganda was first started in regard to the necessity for breeding bulls, many arguments were put forward by the ryots against it. Now however, there is no argument as to the value of good bulls and more attention is being given to ways and means of raising the money to purchase and maintain them. The results are now obvious.

What of the Future? Cattle power today has more competitors than in the past. Railways and Motor lorries are becoming greater competitors for goods transport. Engines and electric motors with pumps are replacing mhotes for water lifting from wells. Therefore with greater competition cattle, if they are to hold their own, must become more efficient and no inefficient and poor cattle should be produced or reared at all. The supply of good breeding bulls must therefore be increased and the work intensified. As already pointed out long term schemes are required and if large subsidies from Government and Local bodies cannot be given, the cattle industry itself will have to bear the increased cost by paying larger service fees.

Milk Production. Up to the present we have dealt mostly with work cattle. The necessity for improvement of cattle for milk production cannot be overlooked. The Coimbatore District Board has already accepted a scheme for placing at stud Scindhe and Delhi buffalo bulls.

With increased industrialisation in large centres like Coimbatore, a larger number of people will cease to have any connection with the land. Nutrition experts point to millk as one of the most essential and perfect foods. The first stage in increased milk supply is the breeding of stock which will produce more milk. The question arises as to where such bulls should be stationed. Some say in the larger towns, others in the villages. Possibly at the present time, there are more milk cows in the larger towns than in the districts and to serve these cows the bulls should be placed there. But what about the calves? In towns they certainly do not get the attention or food required. It is also probable that as the Health authorities become stricter, the number of cows maintained in the larger towns will be decreased on the score of health and cleanliness. In the near future therefore, it is likely that the villages in the neighbourhood of large towns will become the dairy industry and dairy stock breeding centres and milk and milk products only will be transported to the large centres.

The displacement of work cattle by power for lifting water etc., will make room for milk cattle and these will produce the essential Farm yard manure to maintain soil fertility and at the same time pay for themselves by production of milk.

INHERITANCE OF GRAIN SHATTERING IN RICE (Oryza sativa).

By K. RAMIAH & K. HANUMANTHA RAO

Introduction. Shedding or shattering of grain is an important economic character in rice. In cultivated rices this causes a serious loss during harvest and the loss is estimated to vary according to the locality and the varieties, from as low a figure as 5% up to 30%. The firmness with which the ripe grain is attached to the rachis varies widely in different varieties. Wild rices exhibit this character to the maximum extent, the grains here falling away at the slightest impact of wind, even before they are fully ripe. In certain provinces where the cultivated rices get hybridised with wild rices through natural agencies the problem of shedding becomes a serious one. Some of the progenies of these crosses look for all practical purposes like the cultivated types but have the badly shattering character of the wild rice in them. Since it is not usually possible to identify them and eliminate them in the early stages, they form a permanent source of