

VICISSITUDES OF INDIAN AGRICULTURAL STATISTICS*

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As at least the elders can recall, Babu Rajendra Prasad was no stranger to Vizag now known only as Visakhapatnam. He was here during the period of the phoney war to open the Hindustan Shipyard. During that visit he literally took the town by storm by his geniality and charm. He then opened the vista of the vessels built here carrying India's choice products once again to the four corners of the earth and bringing many things in return but I doubt if he would care to include foodgrains among them. Rajen Babu's love of agriculture and agriculturists was unbounded and so was his interest in all data relating to agriculture. Nevertheless, he preferred to steer clear of the controversies of his day. On an occasion such as this, you would no doubt like me to follow the illustrious example. I will certainly try to do so but it is just possible that the temptation to pick a bone of contention will prove irresistible here and there.

IN ANCIENT INDIA

2. In Ancient India after the Aryan settlement, the principal economic activities were the cultivation of land, maintenance of forests and rearing of cattle. The literature of antiquity gave an air of sanctity to the administrative measures to guide agricultural operations and to collect revenue but very little information was recorded on the total area cultivated or kept fallow and the yield in different periods.

3. One of the earliest accounts of the administrative system and social convention in ancient India is given in Kautilya's Arthashastra. There are references in this work to the size of villages, the number of families of agricultural people which a village was to contain and to the division of land. There were also instructions regarding the maintenance of forests and the processing of forest products. There are references to the classification of land according to the rainfall and fertility of soil, *e g.*,

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The quantity of rain that falls in the country of Jangala is 16 dronas; half as much more in moist countries (anupam); as to the countries which are fit for agriculture (desavapanam) —13½ dronas in the country of Asmakas; 23 dronas in Avanti; and an immense quantity in western countries (aparan tanam), the borders of the Himalayas, and the countries where water channels are made use of in agriculture (kulyavapanam).

(Kautilya's Arthasastra by Dr. Shama Sastry : Chapter XXIV)

4. Agriculturists in ancient India were quite conscious of the nature of soil and its relation to the growing of crops. Soils were divided into two classes according to their peculiar fitness for the cultivation of different kinds of crops. Soil watered by river and by rain had also different designations. From the evidence of other ancient Sanskrit works it can be deduced that elaborate attention was paid in ancient India to the classification of soil with characteristic flora. There must have been some system of land survey for the purpose of classification for economic use.

5. Land revenue in ancient India was based on income from the land, the revenue being rated according to the profitability and kind of soil. For instance the Arthasastra recommended that upland and lowland should be entered separately in the field register of the Gopa. It also enjoined a three-fold gradation of villages. The King's share did not necessarily mean a fixed share but was determined by considerations of fertility of the soil, the needs of the State and of the cultivators. The system of measurement and survey and differentiation of soil according to the profitability also indicates that land revenue assessment was not *permanent* in ancient India but was revised at intervals. *In any case, however, the predominance of revenue considerations could not have been an entirely healthy influence on the objectivity of the compilation. In those days as now, statistics collected with a purpose might thus have suffered from many a built-in bias.* How one wishes that somebody had done a "spot check of patwari records in the Mauryan period instead of two and a quarter millennia too late!

IN MEDIAEVAL INDIA

6. The need for efficient collection of taxes to finance the multiple obligations of the growing empire helped the emergence of a strong revenue administration and the maintenance of the agri-

cultural statistics of at least Northern India in a systematic way. The zeal of Muslim chroniclers to record the intimate details of the reign of their patrons lent colour to what would otherwise have been drab statistical accounts and nothing more.

7. The pride of place among the numerous historical and administrative records of the period should undoubtedly go to Abul Fazl's Account of the XII Subas in *Ain-i-Akbari*. W.H. Moreland's paper on the agricultural statistics of Akbar's empire has assessed the import of the figures given by Fazl. In the *Ain*, at the end of the description of each Suba or province, a paragraph is devoted to the number of sarkars and parganas (or mahals), the area, revenue, assignments and strength of the local forces. Similar details are provided for each pargana, arranged and totalled by sarkars, the totals being placed at the head of the tables. Area-figures are given only for those parts of the empire where the *Zabti* or regulation system of assessment had been introduced. This system was based on returns prepared locally for each harvest, showing for each village the area then under crops, and the revenue due from that area at the prescribed assessment rates. In each *Zabti* Suba where areas are recorded, the heading describes the figures as *zamin-i-paimudah*. The process of preparing the returns of areas under crops was known by the technical term *paimaish*.

8. As Moreland has pointed out, the area statistics were based on assessment returns. The revenue known as *jama* was either the demand on individual cultivators or the collection demand on the village or on some larger area. The revenue figures given in the work indicated the probable amount which the administration hoped to collect for the year. Moreland has suggested that the statistics of the area and revenue reflect the assessment returns of just a single year, viz., 40th Ilahi, that is the A.D. year beginning March 1595.

9. *Although the Moghuls refined the method of recording of crop statistics somewhat, the pre-occupation with revenue assessment persisted and in fact gathered greater force.* As we shall see later, it turned out that a number of famines and at least two World Wars were required to change the attitude and the outlook of the administration in the direction of utilising agricultural statistics for social and economic purposes like equitable distribution of food supplies to the population and assurance of fair returns to the producers.

EARLY BRITISH PERIOD

10. On the acquisition of the Diwani of the three rich eastern provinces of the Mughal Empire, Clive continued the system of revenue collection which he found in operation in those provinces. The system was essentially the same as during the time of Akbar. During the century and a half that followed the famous land revenue settlement, some changes did occur in respect of the amount collected and the mode of collection. The share of the State which was originally fixed at one-third of the produce and afterwards converted into equivalent in cash was raised during the reign of subsequent rulers. Gradually also a system of advance payment was introduced and a class of intermediaries came into the field who made advance payment and took away whatever profit could be secured as actual collection from the cultivators or land owners. Thus the increase in the share of the State and the extortion of dues from the cultivators by the intermediaries resulted in severe famine conditions. *When Permanent Settlement was introduced by Cornwallis in 1793, there was no scientific system of estimation of crop yields and cultivated area or of classification of land in operation.*

11. During Bentinck's regime a procedure for reduction in land revenue was evolved. According to this procedure a rough summary of all land holdings was first prepared and then a map was drawn depicting every field. The procedure included a professional survey showing the cultivated and uncultivated land, fixation of the land tax for the entire fiscal area and apportionment of the entire amount among the villages in the area. The last two processes have been described by critics as the weak points of this procedure. Although 66 per cent of the rental as revenue was the rule, the rental itself was left rather to guess work. Actually as the relevant manual of the time explained, "We then proceed to investigate the assessment of the government land tax upon the tract, finding out as best as we could from the previous payments, and from the statements of the people themselves, from the nature of the crop and the nature of soil and such various means as experience furnished us what might be considered a fair demand for the government to lay upon it." This shows the utter lack of comprehension of collection and utilisation of agricultural statistics as we understand today, which prevailed then.

FAMINE COMMISSION

12. The Commission of Inquiry on Indian Famines in its Report (1880) dealt with many of the defects of the agricultural

statistics collected at that time. Statistical information of much the same character had been recorded since 1866 by the provinces of British India and published by them in their seasonal crop Reports and Annual Administration reports. There was, however, not even uniformity in the methods adopted by the provinces. For the purpose of a general statistical account of the whole of India, obviously a much higher standard of accuracy was required. The only primary collecting agency available was the subordinate staff of the provincial revenue department. *The revenue systems in the provinces were not themselves uniform and the requirements of statistics had perforce to be wholly subordinated to administrative exigencies.*

13. The Famine Commission felt that the body of village accountants should everywhere be put on a sound and satisfactory footing as responsible public officers with a clearly defined set of duties, but with due consideration to the importance of their permanent connection with their own villages. They recommended that in Bengal and in some other parts of the country where the class of village accountants had ceased to exist, it should be revived. (As might be expected, this recommendation was promptly turned down.) The recommendation was that officials of this class should be appointed for all villages irrespective of the mode of land tenure and the same annual returns should be prepared for all kinds of estates, whether under the permanent or temporary settlement. Field survey was to be introduced in Bengal and intensified in other areas.

14. Over the village accountants there would be a staff of active subordinate officers to check the accuracy of all items recorded. Above them there would be a special statistical officer in every district. He would test and compile the agricultural returns and examine the market prices, and ascertain from these and other data the relative value of each year's crop. It was also provided that a newly appointed Director of Agriculture would control the special statistical officers in each Province and would advise the local government on all matters relating to agriculture as well as statistics. The Commission suggested in addition that a corresponding officer should perform analogous duties under the Government of India.

15. The Report of the Commission is rightly regarded as the starting point of agricultural statistics in India as we find them today. A statistical conference was convened by the Government of India in the following year, as a result of which it was decided to

combine the *information collected by the provinces into all-India reports and the central compilation of these returns began in 1884*. In this way some progress was achieved towards uniformity but the degree of accuracy and completeness were still influenced by administrative considerations. At first the duty of compiling and publishing statistics was entrusted to the Department of Revenue and Agriculture of the Government of India. In 1895 a Statistical Bureau was established to deal with the statistical work of the Departments generally. In 1905 this Bureau was merged in the new Commercial Intelligence Department.

CROP FORECAST MANUAL

16. In 1914, Findlay Shirras was appointed Director of Statistics with independent charge of all statistical work of the Government of India. His Manual of Crop Forecasts is a classical piece of work. Thus the data which had a semi-royal birth in standard forms drawn up by Prince Albert and approved by the International Statistical Congress of 1860 grew steadily through its adolescent stage as appendices to the Administration Reports of District Collectors to full blossom in the form of sturdy volumes of varied statistics. For a wonder, Princely India was wholly impervious to these statistical onslaughts. *In most of the so-called Indian States even the area of cultivable land was unknown till the dawn of Independence.*

INTER-WAR PERIOD

17. In the 'twenties of the present century, C.D. Deshmukh in Central Provinces and J.A. Hubback in Orissa blazed the trail for crop cutting surveys (mis-called experiments) with a view to fixing standard yields for different types of soils and crops. In their time the triangle was considered as respectable a configuration as a rectangle or even a circle. In any case, there was no plethora of statisticians to take sides and refuse to agree on anything. The point is that during this crucial period *it is not the professional statistician in isolation that has contributed to the development of thought leading to improvement in crop estimation but also district officials* belonging to the civil service of whom not a few took the necessary interest as well as firm steps in that direction from their positions of power.

AGRICULTURE COMMISSION

18. The Royal Commission on Agriculture in India in its Report (1928) dealt at some length with agricultural statistics, and showed what amount of information could be obtained from the

then existing data and the method of preparing them. The Commission agreed that the annual figures of area sown with the various crops were on the whole accurate and they compared in this respect very favourably with those published for any other country in the world. The Commission, however, pointed out that there were difficulties arising mainly from the absence of a subordinate revenue staff in permanently settled tracts. In Madras there were village officers in these tracts who acted as a reporting agency, but in Bengal, and Orissa where no such officers were available, reliance had to be placed mainly on the reports from the police. *Wherever possible assistance was obtained from officers of the revenue department such as Khas mahal tehsildars, and circle officers and from district agricultural officers and non-official agricultural correspondents. The information thus collected was forwarded through the sub-divisional officers to the district officer who had discretion to reject or amend the reports in the light of his knowledge or experience.* (Naturally in such circumstances opinion could invariably be expected to score over facts, if any, to the contrary.)

19. The Commission commented on the unsatisfactory character of the statistics but it conceded that the cost of employing a special statistical agency for effecting improvements at all levels would probably be not justifiable then. A major difficulty arose from the practice of sowing food and non-food crops such as wheat and linseed together. Separation in the returns was effected by the subordinate staff in accordance with formulae which were prescribed by the provincial authorities but which differed in different provinces and according to the type of mixture. The Commission considered that the errors arising from this source were not such as to invalidate the statistics but suggested that the formulae should be tested from time to time by field trials. The trials were to be conducted by the agency which did the ordinary crop-cutting experiments.

20. The Commission observed that the estimates of normal yield required considerable improvement. The estimate was based on crop cutting experiments made over a number of years compared with such other information as might be available from trade statistics, settlement investigation etc. The agency which carried out these experiments was almost entirely drawn from subordinate revenue staff. The Commission considered that the departments of agriculture required strengthening by the appointment of an expert statistical officer at headquarters and it would be the duty of

such an officer to advise as to the measures required to render the system of crop cutting experiments effective.

BOARD OF AGRICULTURE

21. The Commission agreed that no satisfactory alternative basis for calculating a standard yield was available and in that connection referred to the views expressed by the Board of Agriculture which had examined the point already in 1919 and 1924. The Board had pointed out that while the fullest advantage should be taken of available trade statistics it was not possible to obtain the figures for the total production from such statistics. Thus crop cutting experiments would have to remain the sole basis of the determination of such standards. The Board had also observed that the whole difficulty in the past had been to get an adequate number of crop cutting experiments under proper supervision and recommended that means should be devised to reduce the size of areas to be cut and weighed. The condition factor so-called was also in trouble at about this time although post-mortem investigation spread over a generation had produced tangible evidence in its defence, e.g., the *annawari* estimates for a continuous period of 20 years yielded the 'normal' number of annas in most cases. In any case, I would not pursue this particular point as it is no use flogging a dead horse.

22. One of the revolutionary hints thrown by the Board was that in some provinces the larger growers could give fairly reliable figures of the actual outturn of known areas and in some cases this method offered the most promising line of improvement. The commodity committees performed yeoman service in this line. The Board considered that possible correlations of area with the meteorological and economic data should be investigated. The result of such studies, if successful, would probably enable reasonably accurate information of the area under forecast crops to be given at an earlier date and would be a most useful supplement to the published information which was necessarily based on the opinions of a number of crop reporters. For jute in particular, the possibility of correlating the height of plants with the final figures of yield should be investigated and other such criteria may be worth examination.

23. *The abolition of returns of inland trade as a result of the recommendations of the Inchcape Committee in 1922 had destroyed the only possible means of checking standard outturns for the commercial crops.* The standard outturns for various crops in use had resulted from crop cutting experiments made over a number of years. Changes

should not be made perfunctorily but only as a result of an adequate number of crop-cutting experiments.

24. Upon the whole, this was an era when statisticians and district officers entered into fruitful co-operation in their area of common interest. Research also came into its own. A great advance was also made in encouraging collective thinking and team work on the part of specialists in meteorology, irrigation, forestry and animal husbandry together with the new statisticians but *Universities and other learned institutions still remained quite outside the inner circle.*

COUNCIL OF AGRICULTURAL RESEARCH

25. In the 'thirties, the Indian Council of Agricultural Research which was set up on the recommendation of the Commission on Agriculture did some pioneering work in applying the modern methods developed by Prof. R A. Fisher at Rothamstead to Indian conditions. The finances raised through export cesses on agricultural commodities and placed at the disposal of the Council also assisted related researches in Government departments and in the Universities. Activities of experimental stations were simultaneously expanded but concerted efforts were not forthcoming in the direction of expanding the new methodology to cultivators' fields.

WORLD WAR II

26. The Second World War gave further impetus to the search for improved accuracy in crop estimation. A Statistical Adviser was appointed to the Council of Agricultural Research and his organisation was expanded suitably. Plans were put into operation with vigour not only for estimating the yield of crops more accurately but also for giving practical shape to improved methods of cultivation and the multiplication of more productive seeds and trying out new types of manures and other inputs.

SINCE INDEPENDENCE

27. The above steps did produce very good results in the field of agronomy and agricultural experimentation but they could have paid even more handsome dividends but for the emergence of an octopus in the form of a Multipurpose (sic) National Sample Survey. *The world over, authority is known to be extremely selective in respect of statistics.* It does prefer to "radiate" from *a priori* conclusions—or we might even say hunches to ready-made data which seems to corroborate its own pre-conceptions. It was therefore not surprising that Rajen Babu's successor as Food and Agriculture Minister

should prefer the generous estimates of foodgrain output put out by the N.S.S. The then Chief Minister of Madras, a lifelong colleague of Rajen Babu's, had already taken a decision in favour of food decontrol but logically his premises were sounder based as they were on summary rejection of *all* statistics. The State Governments were nevertheless persuaded to strengthen their machinery and to encourage statisticians to try out alternative methods of estimation of crops but alas (!) there can be too much of even variety. Even so, work is yet to gather momentum in other directions such as evaluating the contribution of experimental stations and the application of linear programming methods to the manipulation of inputs including irrigation and natural and chemical manures.

THE FUTURE

28. In the training projects intended for agricultural statisticians also ways and means must be found of infusing a balanced outlook as between the mathematical, analytical and administrative talents in the profession. If I may, I would earnestly urge the agricultural statisticians to begin to think of sparing some of their intellectual resources for analytical work of the above nature. *Survey and experimentation are of course important lines of work but the data resulting from them will remain unutilised and partly wasted unless and until the brilliant minds which go into the planning of the whole undertaking are also tuned to the interpretation of the data.*

29. Yet another field of analysis which awaits the attention of agricultural statisticians is the study of the subtle inter-relationships which could be revealed by the statistics of prices of agricultural commodities. In this context I vividly recollect the interesting problem posed by Rajen Babu almost immediately after he assumed office as President of India, of the parity levels of the prices of oil-seeds and foodgrains and their causative role in the diversion of land from one to the other. It is known that the prices received by the farmer at harvest time are collected by commercial banks. There is no visible sign, however, that the enormous utility of related correlational studies and forecasts based on them has been recognised. This is clearly a task which could be discharged satisfactorily only with the co-operation of economic experts. Their help has to be invoked in good measure. Dr. S R. Sen's presence in our midst today is itself an assurance of such co-operation in the joint effort.

30. Plantation crops have problems of their own. They cannot be 'cut' but forecasts are needed for them also. Coffee in

particular is known to have aristocratic idiosyncrasies at all stages of growth to fruition. I know that the Institute of Agricultural Research Statistics has conducted pilot surveys for evolving suitable sampling techniques for the estimation of the production of fruits but generally minor crops like vegetables, onions and chillies, grass lands, forests, fisheries and livestock statistics have been more or less languishing for want of attention. Stray surveys and studies in these fields have been noticed from time to time in Indian and foreign Journals but they require to be brought together prominently to the notice of economists, sociologists and socioeconomic statisticians who would often find in them an answer to a long prayer. For example, in the course of my own day-to-day work as Director General of Commercial Intelligence & Statistics, one of Prof. Finney's old articles on mixed farming came in handy. Another and more telling example is the data on land-plough ratios appearing in the forgotten publications like Agriculture and Animal Husbandry in India which were turned to good account by Shri Tarlok Singh in his path-breaking work entitled 'Poverty and Social Change' for estimating the size of the surplus labour employed in agricultural pursuits.

CONCLUSION

31. In conclusion, hailing as I do from a hilly hamlet with sylvan surroundings boasting of plenty of rains, lots of irrigation works and appreciable cattle wealth, I must admit to having shown inadequate reluctance in accepting Dr. Panse's invitation to be here with you today. Perhaps I have ventured too far but these suggestions coming from a well-meaning and wholly appreciative if not too knowledgeable co-worker are for the sympathetic consideration of your learned Society in the context of its work programme for the next two years.

I thank you all.