ORIGINAL ARTICLES.

THE CULTIVATION OF PADDY (ORYZA SATIVA) IN THE NEIGHBOURHOOD OF PERADENIYA.

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Introduction.—Rice is the staple food of the Island. It is regrettable that paddy cultivation is the least remunerative and consequently the least attractive of the major agricultural industries of the Island from the point of view of the land-owner, owner-cultivator or tenant-cultivator. General improvements are possible in three directions:—

1. Improved cultural methods,
2. Use of higher-yielding selected paddies,
3. Improvements in the economic conditions of the cultivator.

It is not possible to suggest definite improvements to better the lot of the *goiya* or cultivator without a preliminary study of the conditions, requirements and prevalent practices of each locality and without experimental data obtained at each centre. Investigations into the various problems of paddy cultivation overwhelm one with the increasing diversity and complexity of their nature; consequently suggestions for improvements should be made with caution.

It was suggested by the Economic Botanist that the writer might make preliminary enquiries at important centres. The first centre selected was Peradeniya with its outlying villages of Gannoruwa, Meewatura, Héndeniya, Yalagoda, Eriyagama, Bowala and Siyambalapitiya. Enquiries commenced in May, 1928, and were carried on as time permitted. On July 25, 1928, the Food Products Committee of the Board of Agriculture resolved that with the assistance of local sub-committees enquiries should be made into the conditions under which paddy is cultivated in the different districts of the Island; hence future enquiries will be left in the hands of the sub-committees.

Climate.—Peradeniya is situated at an average elevation of 1,550 feet above sea level. "The climate is warm, moist and very equable, the mean average temperature being 76°F. In the early mornings of January and February temperatures around 55°F. are recorded."*

Average number of rainy days and average rainfall by half-monthly periods at Peradeniya for the ten years, 1917-1926.

Month	Rainfall in inches		Number of rainy days	
	1st half	2nd half	1st half	2nd half
January	3·58	1·80	6·3	3·3
February	0·98	0·93	1·9	1·6
March	2·60	2·80	4·5	4·9
April	2·74	3·32	5·3	6·9
May	4·16	2·99	6·8	5·1
June	5·10	5·44	9·0	10·4
July	2·71	5·06	8·1	10·5
August	5·02	3·09	9·5	9·3
September	2·45	5·99	6·2	7·9
October	4·03	8·14	7·2	10·4
November	6·41	6·62	10·7	7·6
December	4·03	3·50	6·3	5·3

The above table shows that rain falls in both monsoons. The north-east monsoon rains proper fall in October-January and the south-west monsoon rains in May-August. The latter half of January-April is the dry season. The annual rainfall averages 93·49 inches and falls on an average of 165 days.

Paddy Soils.—The paddy soils of the Peradeniya district are rather light. Some fields at Gannoruwa receive light alluvial deposits as a result of the more or less annual overflow of the Mahaweli-ganga.

Seasons and Varieties.—The two main seasons are *maha* (long-aged) and *yala* (short-aged). A *meda* or mid-season crop is not cultivated. The principal crop is grown in *maha* when varieties maturing in 6-7 months are grown during the north-east monsoon rains. Cultivation commences in the latter part of August or in September. The *goda-kumburu* or drier fields are sown with a 5-months variety. If the north-east monsoon rains are late, a correspondingly shorter-aged variety is grown. During *yala* only some of the low lying *mada-kumburu* or muddy fields are cultivated with varieties maturing in 3-4 months. Cultivation commences in March-April with the advent of the south-west monsoon.

* *Guide to the Royal Botanic Gardens, Peradeniya* by T. H. Parsons.

The principal varieties grown are as follows:—

Season	Variety	Age	Remarks
Maha	Sudu Hatiel	7 months	Sown on *mada-kumburu*
	Kalu Hatiel	,,	
	Mawi	,,	
	Suduwi	,,	
	Ratawi	6 months	
	Sudumawi	,,	
	Hondarawala	5 months	Sown on *goda-kumburu* and late sowing on *mada-kumburu*
Late maha	Heenati	4 months	
Yala	Heenati	,,	
	Balawi	,,	

Cultivators do not reckon the age of a crop from time of sowing to the time when the crop is actually ready for harvest but to the time they are able to harvest it; hence it is safe to reduce the ages by a fortnight.

Although the area under survey is within a radius of three miles of the Royal Botanic Gardens, yet the cultivation of different varieties of paddy in the different localities testifies to the diversity of requirements and conditions prevalent. For instance, most of the terraced fields at Siyambalapitiya possess only about 8 inches of surface soil; below this is an impermeable lateritic subsoil. The writer was informed that several varieties were tested in the locality but only *Suduwi*, *Maha Hatiel*, and *Ratawi* for *maha* and *Heenati* for *yala* proved suitable. Possibly the suitability and adaptability of the root-systems of these varieties to the existing soil conditions accounted for their success. This would appear to point to a new factor which requires consideration when studying the suitability of a variety or selection to a particular tract.

Irrigation.—The crops are mainly rain-fed but are dependent on regular irrigation from small streams conveying the percolating water from hillsides and underground springs. Water storage facilities do not exist in the locality but a more or less satisfactory and steady stream of water from the surrounding hills can be depended upon. Usually the upper fields are flooded and water is allowed to flow into the lower ones through temporary breaches in the bunds. If the excessive meanderings of the streams were corrected, the embankments strengthened and silt cleared regularly, the frequent damage caused by overflow of water during rains would be minimised to an appreciable degree.

Manures and Manuring.—Systematic manuring in any form is not practised. The fields bordering the high land receive the loppings of overhanging branches. In some parts cultivators may occasionally apply a few bundles of tender branches and leaves of *kekuna* (*Canarium zeylanicum*), dadap (*Erythrina lithosperma*), *Gliricidia maculata*, etc., immediately after the second ploughing. A few cultivators who own roadside fields and those who find accumulated heaps of cattle manure in their compounds and whose fields are not too far away at times apply cattle manure at the rate of about eighty basketsful per acre. One or two cultivators are known to collect dry fish heads from the neighbouring boutiques and apply them to the fields. The above, however, are the exceptions rather than the rule. Artificial manures are not applied, the reason stated being want of ready cash to purchase them. It is very doubtful whether manures would be purchased even if money was available. In defence of the cultivators it may be pleaded with considerable truth that both owner-cultivators and tenant-cultivators are invariably too poor to purchase artificial manures. The landowners who can afford to meet the cost are indifferent and leave the tenant to do his best, but demand a half-share of the produce irrespective of any expenses incurred by the tenant in attempting to increase the yield. The tenant-cultivators do not find it economical to manure the fields as they receive only a half-share of the produce and, further, they cannot expect with any degree of certainty to retain the lease of a field for two or three consecutive years. No valid plea, however, can be brought forward in defence of the cultivator who does not take the trouble to apply farmyard manure or green manure which exist in abundance in the neighbourhood.

Seed and Seed Rates.—Seed-selection is not practised. A few cultivators thresh, as early as possible, the produce of the best-ripened field and reserve it for seed purposes. This seed is stored in the *attuwa* or horizontal shelf over the kitchen fire or in wooden boxes, or it may be packed in gunny bags and stored in a convenient place. Seed is not thoroughly winnowed before storage, the reason stated being that more good grain is exposed; consequently it is attacked by insects and many empties result. Usually cultivators reserve sufficient seed for the next season's sowing. In case a cultivator is obliged to borrow seed-paddy, he has to return the quantity borrowed with 50 per cent. interest in kind at time of harvest. If he has to secure seed from outside his village where he is not well-known, he has to pay cash. At sowing time a bushel of paddy costs about Rs. 3-00 and at harvest about Rs. 2-00. It will be seen that the value of seed-paddy at sowing time is approximately equivalent to the value of the same quantity of paddy plus 50 per cent. as interest at harvest time; hence the interest on seed-paddy charged by villagers is fair.

Cultivation.—About 25 per cent. of the *maha* crop is transplanted. The remainder is broadcasted, and, after about two months, it is thinned out and the vacant spaces are filled with the uprooted seedlings. The *yala* crop, being a short-aged one, is never transplanted. Preparatory tillage consists of the operations described below.

About 7-10 days prior to the first ploughing or *bin-neguma*, breaches in the bunds are repaired and water let in to soak the soil. The village plough (see fig. 6) drawn by a pair of buffaloes (see fig. 4 for yoke) is then brought into use. One pela or $\frac{1}{2}$ acre can be ploughed by a pair of buffaloes in a working day of about $9\frac{1}{4}$ hours. After the first ploughing the fields are flooded in order to decompose the weeds and are kept submerged for a period varying from a week to a month, depending on the state of decomposition of the weeds, the convenience of the cultivators and, above all, the suitability of weather conditions for sowing. The cultivators realise the benefit of thorough decomposition of weeds. It may be of interest to note that experiments conducted by the Department appear to indicate that better results can be obtained by burying green manures late rather than early. The second ploughing or *pitaheluma* or *dehiya* is performed 10-14 days before sowing. This operation is also done with the village plough. About 10-12 *lahas* or $\frac{1}{2}$ - $\frac{3}{4}$ acre can be ploughed by a pair of buffaloes in a day. Ploughing of fields is immediately followed by scraping of bunds with mamoties (see fig. 3) and by plastering them, lopping of overhanging branches along the boundaries and burying them in the fields by trampling under foot. Fields are then flooded to their full capacity.

Immediately the above operations are completed attention has to be paid to the preparation of seed for sowing. The process is as follows. The seed is thoroughly winnowed and soaked overnight in a suitable receptacle for 12-14 hours. If a suitable receptacle is not available, seed is packed in a gunny bag and lowered into a well or submerged in standing water in the field. The next morning water is drained off and along with it any light grains found floating. The soaked seed is heaped on leaves of plantain (*Musa* sp.), *alakola* (*Alocasia*) or arecanut (*Areca catechu*) and placed on the ground in a dark cool place inside the house. The heap is then covered with more leaves and gunny bags or mats and weights are placed on it. The seeds germinate and are ready for sowing in 6-7 days. If it is desired to hasten germination, more covering and greater weights are applied in order to raise the temperature in the heap; if germination has to be delayed, lighter covering and fewer weights are provided. If, after seed is ready for sowing, unforeseen circumstances delay the process, the weights and coverings are removed and air is permitted to play upon the heap. This checks the speed of development of the sprouted seed to an appreciable degree but does not impair its

vitality. The heap is never broken up and spread out as it is believed that many radicles would be damaged in the process and such damaged seeds dry quickly. No harm is done, however, if the radicles are so damaged just before sowing.

The third ploughing or *madaheiya* is done 2-3 days prior to sowing. This operation consists in ploughing the fields a third time and levelling them roughly by turning the plough on its side and fixing a temporary handle with which to guide the improvised leveller. The operation of levelling is known as *madaedduma*. In case a part of the field has been silted and it is necessary to draw a large quantity of mud from that part and spread it evenly all over, the large levelling board or *porulalla* (see fig. 5) drawn by a pair of buffaloes is used. This operation is known as *paledduma*. In case only the third ploughing and *madaedduma* is necessary a pair of buffaloes can work 1 - 1½ pelas or ½ - ¾ acre per day. After levelling ½-1 inch of water is left in the field before the final levelling or *goygauma* is done in the morning prior to sowing. Hand levelling boards (see fig. 1) are used in levelling the fields and opening up shallow surface drains in a fan pattern which converge on a point at one end of the field. Each block thus separated by surface drains is given a final levelling, the cultivator walking backward in order to cover his foot-prints. The fields are then completely drained.

Sowing.—Handfuls of sprouted seed are worked between the palms. This causes the seeds to separate to an appreciable extent with their radicles damaged as little as possible. Seed is then scattered in the fields in a remarkably even manner. One man can sow a little over 2 acres per day. The explanation offered for the non-establishment of seedlings along the shallow drainage channels is that the seeds become too deeply buried in the fine mud.

Irrigation.—Water is not let into the newly-sown fields until the surface shows faint signs of cracking. In *godakumburu* or drier fields water has to be let in after an interval of about three days. In *madakumburu* or muddy fields it would not be necessary for 6-7 days after sowing. At the first irrigation, 1 inch of water is permitted to flood the fields evenly and after an interval of twenty-four hours is drained off in order to minimise the damage done by land crabs and the possibility of some of the seedlings being drowned. Again, after an interval of 2-5 days which depends on the nature of the fields, an inch of water is let in when faint signs of cracking are noticed. In case crabs cause noticeable damage the fields are once more drained after a day or two and allowed to dry as before prior to having the third and final irrigation. After this the fields are not dried during the growing period. By now the seedlings are well developed and are rarely damaged by crabs. After the second irrigation, if crab attack is

not noticeable, water is retained in the fields. As the plants grow the level of water is raised until it reaches about 4 - 6 inches. Fields are finally drained when the grain is in an advanced milk stage and culms show signs of yellowing.

Transplanting.—When fields are transplanted with seedlings raised in a separate nursery, 1½-2 months old seedlings depending on their growth are used. If nurseries have been sown thickly or on poor soil, seedlings are not transplanted until they are about two months old; but, when sown thinly and if they are well developed, 1½-months old seedlings are transplanted. The reason stated for not transplanting month-old seedlings is that such seedlings are delicate and are more liable to be damaged on uprooting and to suffer a setback. Fields are not completely drained before transplanting as ½ - 1 inch of standing water facilitates the operation. Some cultivators suggest that, when transplanting is done in a flooded field, the clay in suspension settles down and affords a firmer seed-bed to the seedlings. The nurseries are flooded overnight and women usually pull up the seedlings, wash the soil from the roots, and tie the plants into bundles of a size conveniently handled in transplanting. Before transplanting the tops of the bundles are broken off with a twist of the hand, leaving about 6-8 inches or even 12 inches of stalk above ground level. The bundles are held in one hand and with the other three or four seedlings at a time are selected with the fingers at the roots and with a single thrust are set in the mud with a slight inclination to windward. Each bunch is set 2-4 inches apart in the rows. The women move backward across the field. Topping the seedlings and planting them at an angle are regarded as precautionary measures to minimise the chances of plants being blown down. All fields are drained the same day they are transplanted in order to provide a firm seed-bed. After about three days 1 inch of water is let in. Subsequent treatment is similar to that given to broadcasted fields.

Weeds and Weeding.—The rapidity of subsequent weed growth depends on the cultivation given and the time allowed for decomposition of weeds. About two months after sowing broadcasted fields are weeded once at the time they are thinned out and the vacancies are filled. The cost is about Rs. 10-00 per acre. Transplanted fields are not weeded. The weeds commonly met with are *Fimbristylis milacea* (*kudumatta*,) an aquatic weed which is by far the most troublesome, *Cyperus flavidus* and *Cyperus pilosus* (*thun hiriya pan*).

Harvesting and Stacking.—Harvesting is usually done by men using sickles (see fig. 2). About 4-5 inches of stubble is left. In muddy fields a little over 6 inches of stubble may be left. Immediately paddy is harvested in wet fields, women spread the plants on the nearest bunds to dry. On dry fields they are allowed

to remain in the field until evening when they are carried to the *kamatha* or threshing floor. A *kamatha* is used jointly by several cultivators. Those whose fields are harvested first get their produce threshed first. The harvested paddy may be carried to the *kamatha* the same day or the day after, depending on the storage space, and stacked in loose bundles. The stacks may be of two kinds:

1. *Rana kanda*, i.e., the loose sheaves stacked in a row with the earheads in one direction. This is done only if threshing is possible in a few days or no rain is anticipated. Seed paddy is usually reserved from the threshings of this stack.

2. *Kolegahanawa*, i.e., the loose sheaves are stacked in a circular arrangement with the earheads towards the centre, the topmost layer within easy reach and tapering to a point. The top layer is covered over with straw, if available, or with a few sheaves. If the paddy has not been well dried and threshing is delayed, fermentation takes place and destroys the viability of the seed. Unless another paddy crop follows, the fields are not ploughed soon after harvest although it is possible to do so in most cases.

Threshing.—Threshing is usually done in the cool of the night by buffaloes which are driven in a circular path over a heap of the paddy. If harvesting operations are not interfered with and if the *kamatha* is situated in a shady place or if wet weather is anticipated, threshing may take place during day and night. Three or four men with a pair of buffaloes and a boy to drive the latter can thresh the produce of $\frac{1}{2}$-acre or one *pela* in a night. Grain is lightly winnowed and is then ready for transport.

Yield.—The fertility of individual fields is very variable. Long-aged varieties yield more than short-aged varieties. The crop grown during *maha* yields about 30-35 bushels of grain per acre and 800-900 bundles of straw. Each bundle weighs about $1\frac{1}{2}$ lbs. Some cultivators claim yields as high as 60-75 bushels per acre but the accuracy of these figures is questionable. The *yala* crop yields about 15-18 bushels of grain and about 600 bundles of straw. A rough average yield per acre for the entire tract approximates to about 30 bushels in *maha* and 15 bushels in *yala*. The value of a bushel of paddy soon after harvest is about Rs. 2-00 and later in the season Rs. 2-50 to Rs. 3-00. The straw is used for thatching roofs and for feeding draught cattle. The value of 100 bundles is about Re. 1-00. Very wide tracts of paddy land do not exist in any of the localities surveyed. Both grain and straw are rarely sold outside the village as the output is required for individual and local consumption.

Pests and Diseases.—(a) Pests. 1. *Paratelphusa* (*Oziotelphusa*) *hydrodromus* Herbst. The small land crabs commonly met with in paddy fields do considerable damage by breaching the

bunds of terraced fields and make retention of water in such fields very difficult. In broadcasted fields the seed rate is heavy, hence the damage done by crabs is not serious but in transplanted fields appreciable damage may be caused. In a certain locality which is favoured with a ready supply of water and in which the fields are terraced and are afforded rapid drainage, the cultivators drain the fields nightly till the seedlings are about 10-12 days old. The reason stated is that crabs feed mostly at night and move more freely in water. No direct control measures are adopted except that permission is granted occasionally to Tamil coolies to capture the crabs for eating. 2. *Leptocoriza varicornis* (paddy fly). When this pest appears in large numbers the *yakdessa* or *charmer-away-of-paddy-fly* is sent for. His incantations accompanied by the blowing of a shell horn are supposed to minimise the damage that would otherwise have been caused. One cultivator informed the writer that when the *goyam messo* provoked him by appearing in large numbers and persisting in its attack he placed at night around the affected fields several lighted torches made of dry coconut branches and drew a rope lightly over the plants. The disturbed insects were attracted by the lights and they flew straight into them and were burnt. When questioned why this excellent practice was not carried out every season before damage was caused by the fly, the cultivator replied that he used the method described only when *taraha giyama*, i.e., when provoked. 3. Rats. About four different types of rats are known to cause damage to paddy. Preventive or remedial measures are not adopted. Occasionally Tamil coolies come round after the fields are harvested and capture the rats for food by digging or smoking them out of their burrows. 4. Birds. Mostly *munias* (*Uroluncha striata striata*) come in flocks and cause considerable loss by feeding on the mature grain. Field alarms are improvised and boys and girls are employed to scare the birds. 5. Cattle. Fields are not fenced. Owners tie up their cattle when a crop is growing. Should cattle belonging to fellow-villagers stray and cause damage no claim is made, but, if they belong to outsiders, the owners have to pay the damage assessed by the local headman before removing the animals. Persistent damage caused by negligence of even fellow-villagers is resented and action similar to that employed against outsiders may be taken.

Serious notice is not taken of stem-borers and other minor pests. Grain when not thoroughly sun-dried before storing is attacked by two pests. 1. *Sitotroga cereallela* (paddy moth). Cultivators believe that this pest lays its eggs on the grain while in the field and that when in storage the eggs hatch out. They believe that a second brood does not develop as the moths find conditions unfavourable and do not lay eggs. The experience of the Department indicates that it is very probable that eggs are laid in the field and that subsequent broods develop while the

paddy is in the store. The life cycle of this pest occupies four weeks. Paddies stored for four and five months have showed moth infestation to a marked degree. It is also the experience of Herrick in America and Fletcher in India that this pest breeds in the store. 2. *Calandra Oryzae* (paddy weevil) is believed to breed in stored grain. Seed stored in the *attuwa* or horizontal shelf over the kitchen fire has been found to be very little, if at all, attacked by either moth or weevil.

(b) Diseases. Seedlings may be attacked by *Sclerotium Oryzae* and *Piricularia Oryzae* may attack both seedlings and mature plants. *Rhizoctonia Solani* is also suspected to attack seedlings. On the whole, fungus diseases are not serious although in certain unfavourable seasons considerable damage may be caused to young seedlings.

Rotation.—Paddy is not rotated with any other crop. In some parts cowpeas are grown on the bunds after the paddy is grown. Even if fields are cropped for only one season, a green manure crop is not grown in the off season.

Labour.—All cultural and harvesting operations are done on a communal or co-operative basis. The necessary human and animal labour is secured to complete each cultivator's area in a single working day. If a cultivator requisitions the assistance of ten others, he turns out to work for the others for ten days. Likewise, should he borrow buffaloes he lends his own animals. In case he does not own buffaloes he hires them at the rate of Rs. 2 per pair for cultural operations and Re. 1 per pair for threshing.

If labour is paid for, as it very rarely is, the following daily rates are current: for men 75 cents, for women 40 cents, for boys 35 cents. Meals are provided by the employer, both to co-operative workers and hired labourers.

Live Stock.—Most of the owner-cultivators own at least a single buffalo, if not a pair. Landowners own more than a pair. The animals are castrated. When they are about three and a half years old they are employed in threshing operations. Only animals of over four years of age are employed in cultural operations. They are capable of twelve to fifteen years of service after which they are permitted to roam about and die a natural death. The religious susceptibilities of the people will not permit them to sell the animals to the butcher. Bullocks are not employed for cultural operations. Usually every cultivator owns at least one or two cows of local breed. Both cattle and buffaloes suffer from want of proper pasture. They are neither stall-fed nor housed at night, but occasionally a few jak (*Artocarpus integrifolia*) fruits or plantain (*Musa* sp.) stems may be chopped up and fed to them. The former is supposed to increase the milk yield of cows. The value of a pair of buffaloes varies from Rs. 80-00 to Rs. 150-00, that of cows from Rs. 20-00 when not in milk to Rs. 50-00 when in milk. Hoof-and-mouth disease may be serious at times.

Cost of Implements.—The implements used locally can be purchased at the following rates: plough Rs. 5-00, yoke Re. 1-50, large levelling board Rs. 5-00, small levelling board Re. 1-00, mamoty (Sinhalese) Rs. 2-00, sickle 50 cents.

Land Measure.—10 laha's sowing extent = 1 pela's sowing extent.

2 pela's sowing extent = 1 acre's sowing extent.

2 acre's sowing extent = 1 amunam's sowing extent.

Grain Measure.—10 laha's = 28 heaped measures = 32 cut measures =1 bushel.

Economic Conditions.—The majority of cultivators have little or no ready cash in hand and no source of obtaining loans except at exorbitant rates of interest. The Afghan money-lender charges 50 per cent. interest and forces the borrower to sign an "on demand" pronote for Rs. 250-00 for any sum actually borrowed under Rs. 100-00. If the sum borrowed is over Rs. 100-00 and below Rs. 250-00 two pronotes each to the value of Rs. 250-00 have to be signed. The system is that the borrower has to sign for at least double the amount actually borrowed. Repayment has to be made within an year by proportionate monthly instalments. Further, a surety who happens to be one of the Afghan's customers has to guarantee payment. The chetty money-lender charges the following rates of interest: for Rs. 300-00 and under 25 per cent., for Rs. 300-00 to Rs. 500-00, 20 per cent., for Rs. 500-00 and above 15 per cent. Repayment of any sum under Rs. 250-00 must be guaranteed by a surety. For sums above Rs. 250-00 either jewellery must be mortgaged or land hypothecated. Payment of instalments can be arranged in a satisfactory manner but interest for the full period is deducted from the principal before the sum is handed over. The coast-moor boutique-keeper gives credit without security for purchases made from his boutique. He, however, charges higher rates for credit purchases. The scheme of charges is as follows. If the total value of the goods purchased is not high, about 5 per cent. extra is charged on each item; if it amounts to a fairly high figure $2\frac{1}{2}$-3 per cent. more is charged. As far as the difference between the cash and credit prices goes, the rates charged compare favourably with those charged by the larger firms.

None of the areas is served by co-operative credit societies except that most of the villagers of Gannoruwa work as daily-paid labourers in the Department of Agriculture and are members of the Royal Botanic Gardens Co-operative Credit Society.

During the period between sowing and harvest and between harvest and sowing of the next crop most of the men and women work as daily-paid labourers on neighbouring estates.

Tenancy Conditions.—Roughly, about 75 per cent. of the fields are cultivated by tenant-cultivators and the rest by owner-cultivators. Most of the fields are endowed to the *Dalada Maligawa* (Temple of the Tooth Relic), the *Maha Dewale* and local Buddhist temples. A fair extent is owned by private landowners, some of whom are not local residents.

The average holding of a tenant-cultivator varies from 1 - 1½ *pelas*, i.e., ½ - ¾ acre. Tenants of temple land pay no rents, but in lieu they perform *rajakariya* (compulsory service) during the annual *Esala Perahera*, and also pay their respects annually to the trustees of the temples, carrying with them a box of sweetmeats, betel leaves, etc., in accordance with time-honoured custom. In case they are unable to perform *rajakariya* in person, they provide the necessary labour or pay the cost of such labour. Failure to meet these requirements would result in legal action for recovery of costs and in loss of tenancy. Tenancies are given up only when the fertility of the soil deteriorates badly. On the whole the tenants do not suffer hardships but much depends on the individual who holds the office of trustee. Some tenants of temple land sub-let to other tenant-cultivators on the usual exacting terms that private landowners demand from their tenant-cultivators.

Tenancy conditions under private landowners are onerous. All leases are held at the will and pleasure of the landowner and a lease may terminate at the conclusion of the season. To obtain permission to cultivate a block of paddy land a preliminary fee known as *madaran* or land tax has to be paid. The tax varies from Rs. 5-00 to Rs. 10-00 for a holding of an acre or under and Rs. 20-00 to Rs. 25-00 for an *amunam*. *Madaran* is supposed to cover permission to cultivate during both seasons but complaints have been made that the fee has been levied each season. During the period of tenancy the tenants are expected to assist the landowner at their social and religious festivities and render such general help as may be needed. On occasions when such work is performed by tenants, their meals are provided free. If landowners are displeased, loss of tenancy is the inevitable result. Several complaints have been made of instances where the landowner, not being able to summon a tenant who happened to be temporarily away from home, secured the services of another villager and in return granted to the latter the lease held by the absent tenant, the transfer to take effect from the next season. Tenant-cultivators of land belonging to either temples or private landowners do not receive any assistance from the trustees or landlords. They have to secure their own implements, buffaloes and seed-paddy. If seed-paddy has to be procured, it is customary to

obtain it from the landowners and to return it in kind with 50 per cent. interest after harvest. As has already been pointed out, the rate of interest is fair. If the usual operations of thinning out, filling in gaps and weeding once are not carried out, a more painstaking tenant may be given the fields for the next season.

In half-share tenancies the gross produce is divided on the *kamatha* or threshing floor as follows: 1. The quantity of seed-paddy sown plus 50 per cent. as interest, irrespective of from whence obtained, is set apart. 2. *Akkiyala* or the share of *the-charmer-away-of-paddy-fly*, if his services have been requisitioned, is next set apart at the rate of 1 *laha* (equivalent to 1/10 bushel or 3·2 measures) for each separate block cultivated by each cultivator. 3. If the absentee landowner sends his *gankaraya* to watch his interests at threshing and division of produce, this individual has to be fed and paid one bushel of paddy for each night he happens to be on duty. 4. After deducting the above items the balance of grain and total output of straw are divided equally between the landowner and the cultivator. In some parts the cultivator gets all the straw. Some of the more exacting landowners expect the tenants to deliver their (the landowner's) share at their places of residence.

Improvements Suggested.—As a result of this preliminary enquiry certain general means of improving the cultivation of paddy may be suggested, for example, the greatly extended use of green manures, particularly on land cropped twice yearly, proper storage and use of cattle manure and probably also of steamed bonemeal which has already given promising results at Peradeniya, growing of tested pure-line selections of paddy and the extension of the common but not universal practices of transplanting and particularly of weeding, the regular clearing of silt from *elas* and irrigation channels and the correction, where possible, of the unnecessary meanderings of their courses. For the preparation of a cheaper and better puddle following the first ploughing, the Burmese harrow (see fig. 7) introduced by the Economic Botanist may be recommended. A Burmese harrow can be constructed by a village carpenter at a cost of Rs. 4-50 or less, exclusive of the cost of wood.

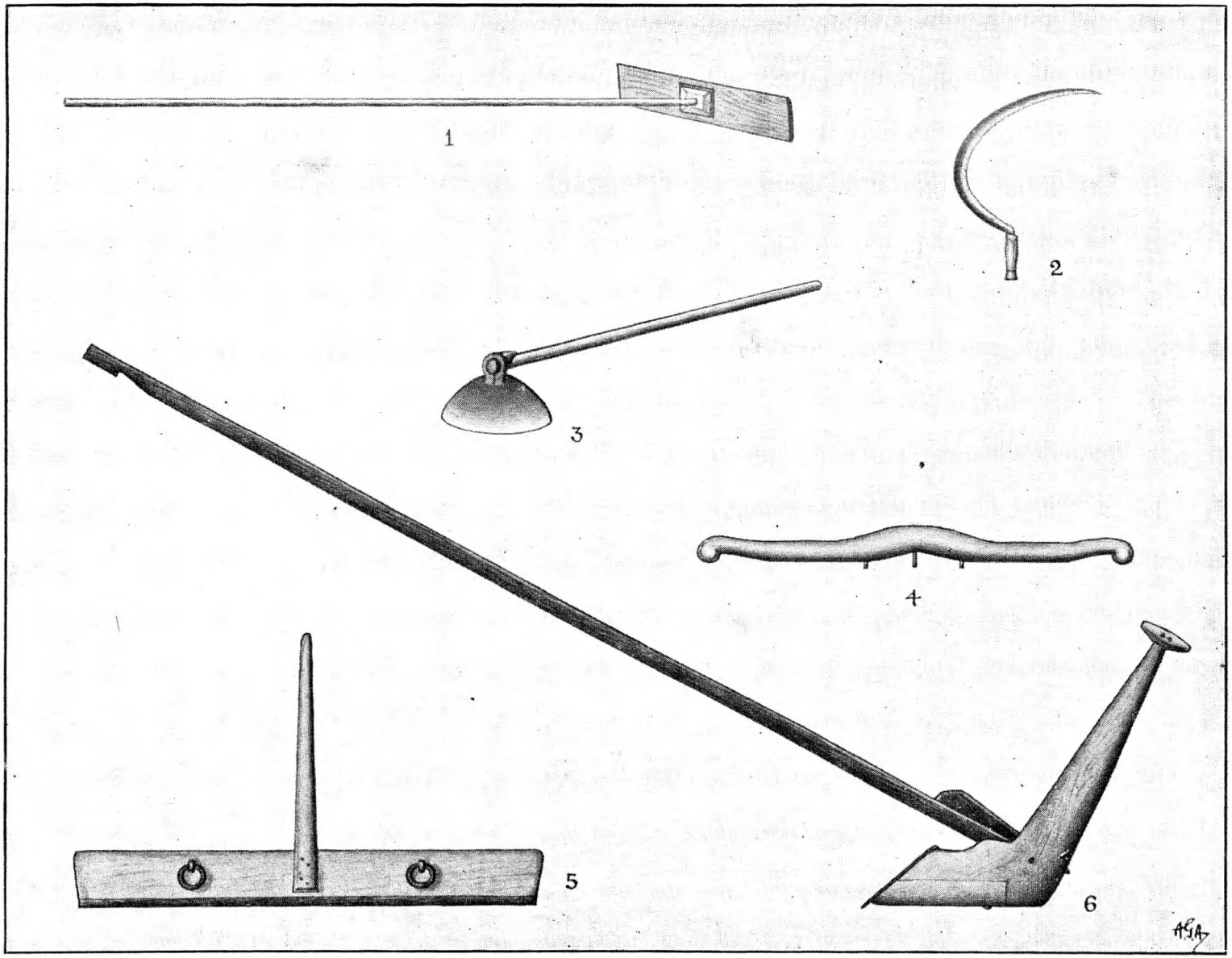
It is to be regretted that no practical methods of controlling insect and rodent pests have yet been discovered. Isolated blocks of fields flowering earlier or later than the majority of fields of a tract will attract all the paddy flies and the damage caused to these

will be considerable. Large areas of paddy should be sown so as to flower at the same time in order to spread the damage over as many fields as possible and permit the minimum possible period during which the pest can feed on the paddy crop. Occasional thorough sun-drying of paddy which has to be stored for a considerable time would minimise the attack of the grain moth.

Tenancy conditions are open to obvious improvements. For example, most tenants would prefer to have land on long lease and preferably on a fixed rental payable after harvest. It is doubtful whether this would meet with the approval of landowners who usually require a large stock of paddy for their consumption and for feeding their dependents; but rent could be paid in kind. Cultivators should be members of a co-operative credit society as it would enable them to obtain cheap credit and also manures, implements and better seed at cheaper rates.

If *madaran* tax is utilised for the supply of green manure, farmyard manure or steamed bonemeal, the accruing results would be of immediate and ultimate benefit, both to the landowners and their tenant-cultivators. This would make paddy cultivation more attractive and less unremunerative than it is. Landowners should appreciate the onerous nature of paddy cultivation and should assist their tenant-cultivators. Constant change of tenancy is the greatest obstacle to any permanent improvements being effected.

In conclusion, the writer wishes to offer his sincere thanks to Mr. L. Lord, the Economic Botanist, for valuable suggestions and help in the compilation of this article.



Indigenous implements used in paddy cultivation.

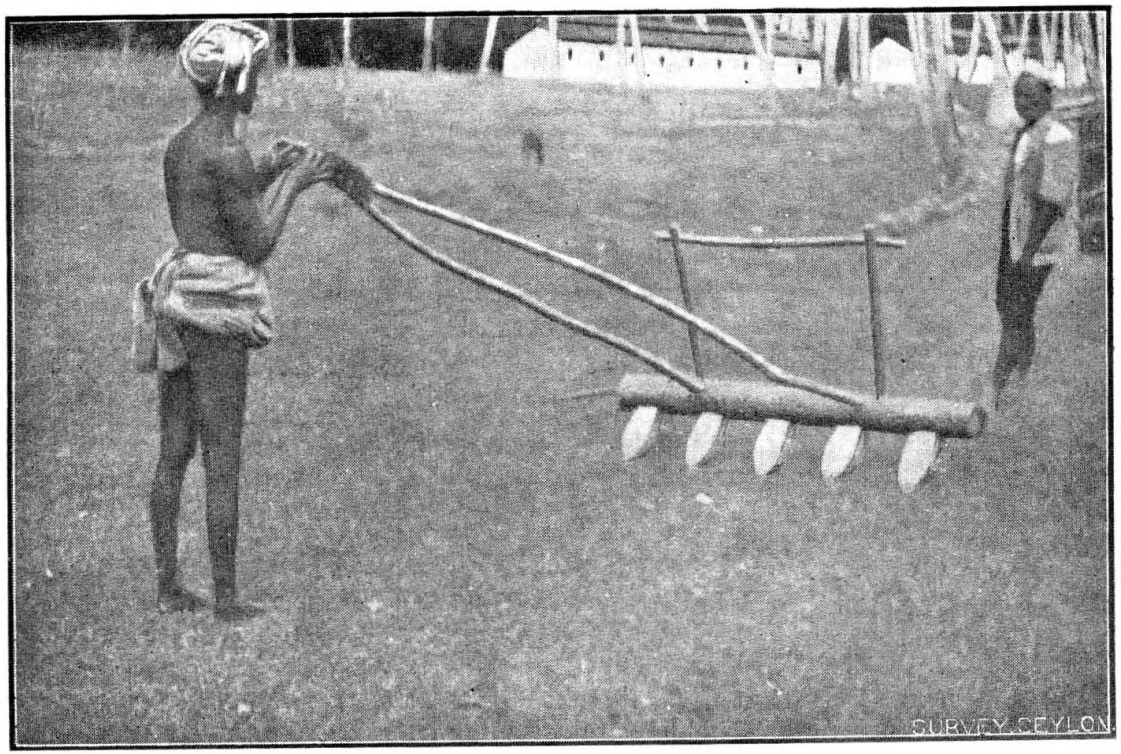


Fig. 7—Burmese harrow.