CROPPING PATTERNS FOR RAINFED FARMING IN THE MARKHAM/RAMU VALLEYS

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INTRODUCTION

Mechanised cropping is expanding in the Markham and upper Ramu Valleys both on large farms and on smallholdings. The main mechanised crops are peanuts, grain sorghum and maize but there is also good potential for upland rice and soybeans.

The best times for sowing these crops can be worked out. To do this, the moisture requirements of the crop, its drought tolerance and the need for dry conditions when it is harvested are matched with the average rainfall distribution for the area. Moisture losses due to evaporation, transpiration and water run-off may also be considered. R.S. Holloway reports work with this method in HARVEST 3(2):60-62.

These sowing times are drawn up using the average rainfall figures but sometimes conditions are very different from average. When this happens, land preparation may be delayed so that the crop cannot be sown at the best time. However, by using cropping patterns based on an understanding of the needs of each crop, the risk of failure is reduced.

In the following article, information about the crops and the average rainfall distribution are used to develop appropriate cropping patterns for three typical sites in the Markham/Ramu Valley.

THE CROPS

Crop requirements

Land preparation should be thorough as all crops, particularly rice, need a good tilth for sowing.

Rice, maize and soybeans all need a lot of water and yields will be reduced greatly by moisture stress. It is important to sow these crops at the right time so that there is less risk of moisture stress. As sorghum and peanuts are more tolerant to draught, sowing date is less critical for them.

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The growing period for those rice varieties being grown now is at least 130 days while the other four crops mature in 100 to 110 days. rice should therefore be sown first.

Peanuts and soybeans are legumes and so they do not need as much nitrogen as the other crops. Maize may need more fertilizers than sorghum or rice.

Weed control

Peanuts, soybeans and rice are easily overgrown by weeds because they grow very slowly as seedlings. Sorghum and maize are not easily overgrown.

Insect control

The worst insect pests are midge and *Heliothis* in sorghum, green vegetable bug in soybean and *Leptocoriza* in rice. These pests have short life cycles which means that their numbers increase rapidly. They all damage the developing grain. Each crop should be sown over as short a time as possible so that the flowering and grain filling periods will be short. This will result is less damage as the pest numbers will have less time to build up.

Some other pests such as armyworms can also attack the crops.

Pest damage is less severe on the legume crops (peanuts and soybeans) than on the others.

Disease control

This is generally obtained through resistant varieties. Peanut rust is the only disease which needs chemical control but this may only be necessary in late sown crops.

Harvesting

All of these crops except maize must be harvested soon after maturity to avoid quality and yield loss. Up to a point, delays in harvesting maize are not harmful. Mechanical harvesters (antoheaders) can be used for all the crops except peanuts which must be lifted and dried before threshing. At present, peanuts are mainly grown by smallholders and harvesting is done by hand. Because of this, it is less important to have dry conditions at harvest with peanuts than with the other crops.

RAINFALL DISTRIBUTION

Three distinct rainfall patterns occur in the Markham and upper Ramu Valleys. At Erap, the overall rainfall is low with the main wet season lasting from December to March (north west monsoon). A less reliable wet season (south east trade) occurs in July/August. At Leron, the total rainfall is slightly higher than at Erap but there is only one wet season, from November to March (north west monsoon). At Gusap the rainfall is higher than at Leron with the wet season (north west monsoon) lasting for longer, from September to May.

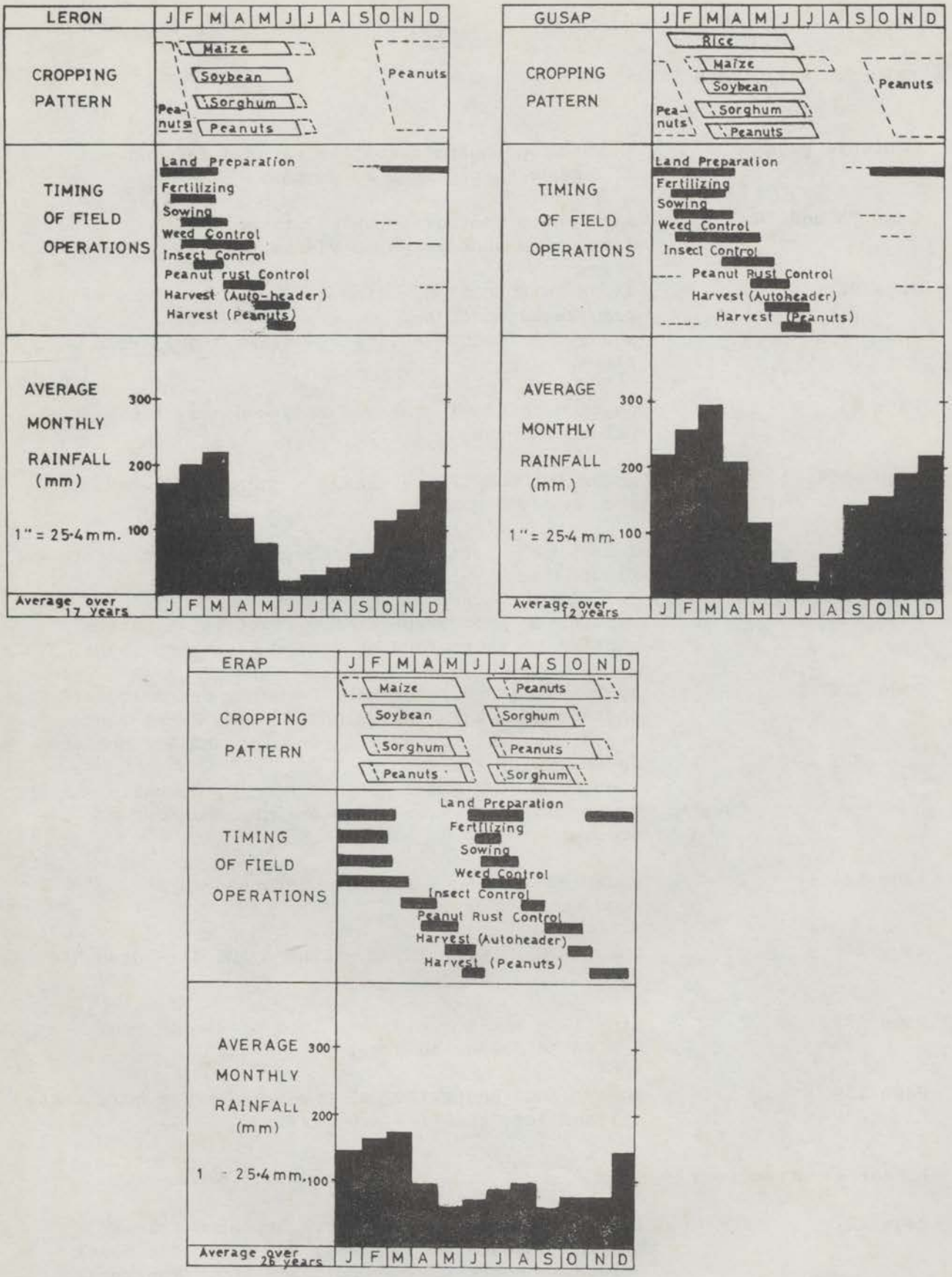
ERRATA

HARVEST 5(2), 1979

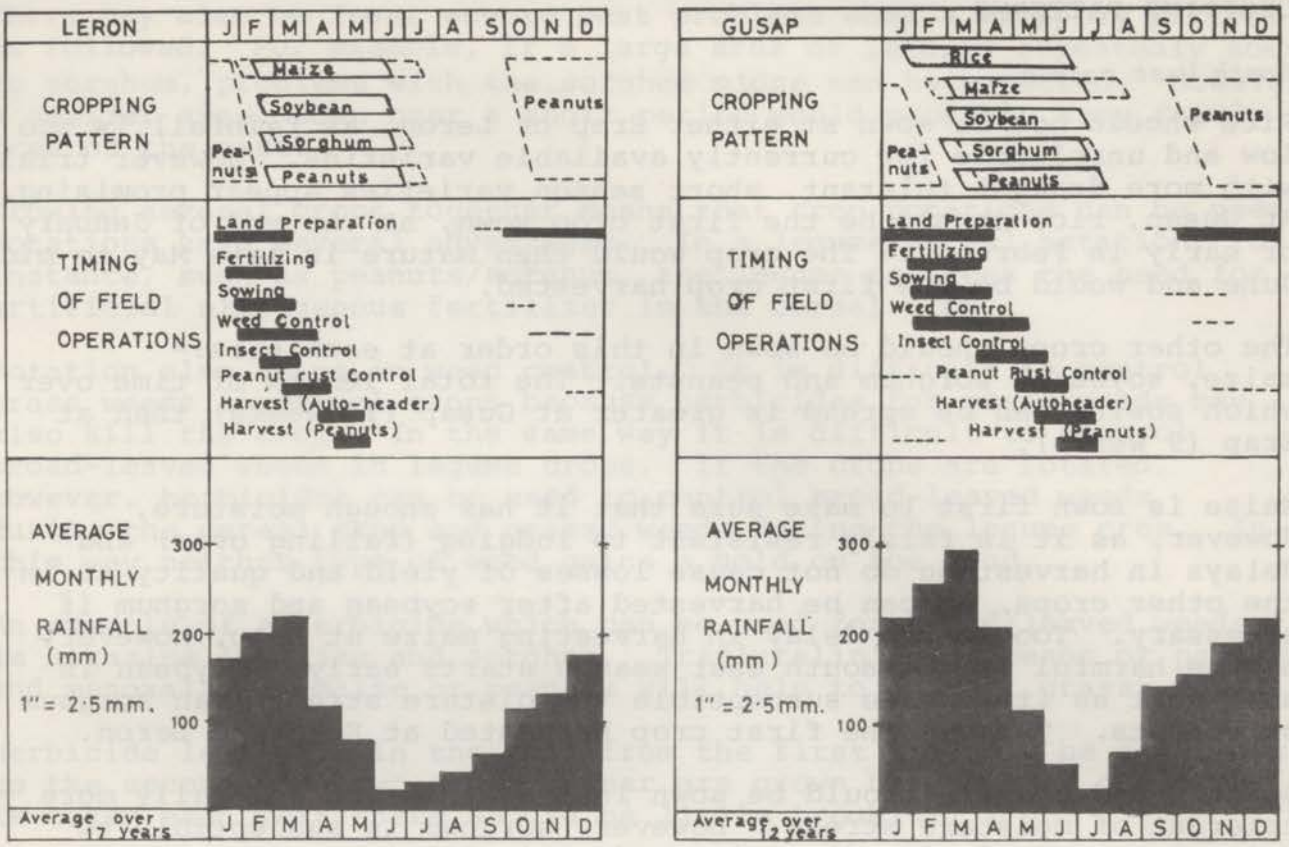
Contents page	*under* Cropping patterns for rainfed farming - J. Sumbuk *should read* J. Sumbak.
Page 73 and 74	caption to photograph on P73 is on P74. caption to photograph on P74 is on P73.
Page 92	*under* INTRODUCTION - line 3 - *Pseudococcidae should read* Pseudococcidae. *under* THE INSECTS - line 7 - files *should read* flies.
Page 93	caption to drawing *should read - A chinch bug* (C. pilosus) *drawn 30 x life size.*
Page 104	*under* INTRODUCTION - line 2 - *mossambica should read mossambicus.*
Page 107	last line - potato flour *should read* sweet potato flour.
Page 116	caption to photograph at top right is at bottom. caption to photograph at bottom is at top right.
Page 123	By P. Vance and J. Sumbuk, Formerly Entomologist and Agronomist-in-Charge *should read* By P. Vance and J. Sumbak, Formerly Agronomist and Agronomist-in-Charge. Foot note - J. Sumbuk *should read* J. Sumbak. *under* THE CROPS - line 7 - draught *should read* drought.
Page 124	*under Harvesting* - line 3 - antoheaders *should read* autoheaders.
Page 126	*under* CROPPING PATTERNS - line 4 and 31 - draught *should read* drought.
Page 131	line 12 - S = space dosage in g/m^2 *should read* S = space dosage in g/m^3.
Page 134	*under* OTHER ABBREVIATIONS the symbols for more than (>) and less than (<) are missing.

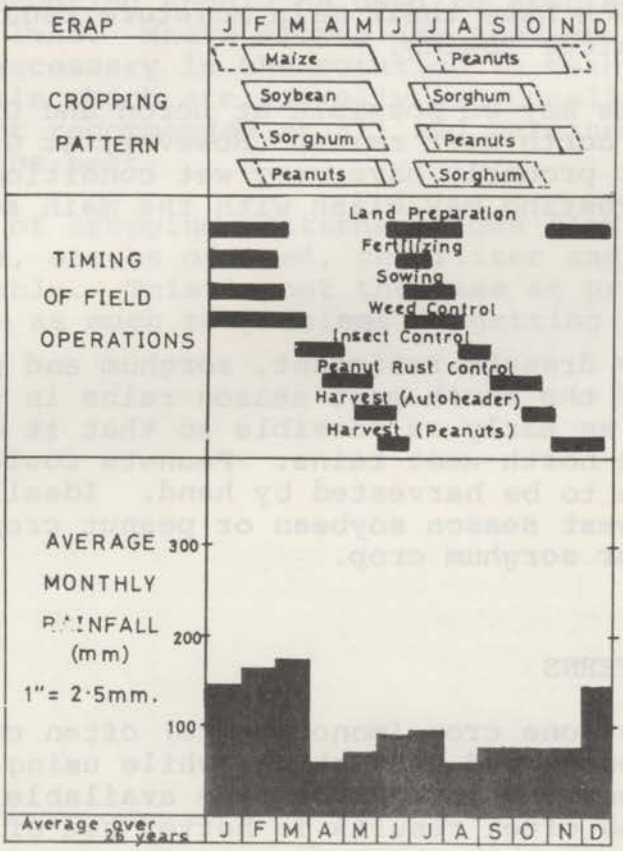
Author's corrections

Page 107	150 micro-metres thick, u.v.l. treated, clear polythene costs K45 per roll NOT K75. The black polythene costs K51 per roll NOT K65. The total cost of polythene per dryer is therefore nearer K10 than K12.



The effect of average monthly rainfall on cropping patterns and timing of field operations at three sites in the Markham/Ramu Valley





The effect of average monthly rainfall on cropping patterns and timing of field operations at three sites in the Markham/Ramu Valley

CROPPING PATTERNS

North west season

Rice should not be sown at either Erap or Leron, as rainfall is too low and unreliable for currently available varieties. However trials with more draught tolerant, short season varieties appear promising. At Gusap, rice should be the first crop sown, at the end of January or early in February. The crop would then mature in late May to mid-June and would be the first crop harvested.

The other crops should be sown in this order at each site:- maize, soybean, sorghum and peanuts. The total length of time over which sowing can be spread is greater at Gusap (12 weeks) than at Erap (9 weeks).

Maize is sown first to make sure that it has enough moisture. However, as it is fairly resistant to lodging (falling over) and delays in harvesting do not cause losses of yield and quality as in the other crops, it can be harvested after soybean and sorghum if necessary. Too long a delay in harvesting maize at Erap, however, may be harmful if the south east season starts early. Soybean is sown next as it is more susceptible to moisture stress than sorghum or peanuts. This is the first crop harvested at Erap and Leron.

Sorghum and peanuts should be sown last as they are generally more tolerant of moisture stress. However, sorghum is susceptible to moisture stress during flowering and grain filling and so should be sown before peanuts which have their main moisture requirement during the first eight weeks after sowing.

A second crop of peanuts may be possible at Leron and Gusap with sowing after the first north west rains. However, at Gusap, sowings after mid-November will probably have very wet conditions at harvest and at both sites, harvesting may clash with the main sowing operations.

South east season

Because they are fairly draught resistant, sorghum and peanuts could be sown at the start of the south east season rains in the Erap area. Sorghum should be sown as early as possible so that it can be harvested before the start of the north west rains. Peanuts could be sown a bit later when they are to be harvested by hand. Ideally, sorghum should follow a north west season soybean or peanut crop and peanuts should follow a maize or sorghum crop.

EFFECT OF CROPPING PATTERNS

Repeated growing of just one crop (monoculture) often causes problems in land preparation, sowing and harvesting, while using a number of different crops lengthens the periods of time available for carrying out these operations and often results in better use of machinery. It also allows the crops to be sown nearer to the recommended times which lowers the risk of crop failure.

There may also be fewer severe pest problems when a cropping pattern is followed. For example, if a large area of land is repeatedly sown to sorghum, problems with the sorghum midge can be expected. However, a smaller area, sown over a short period would probably stay fairly free of the pest.

Growing several crops together means that crop rotations can be used. Rotations have several advantages. In a legume/cereal rotation, for instance, such as peanuts/sorghum, the legume replaces the need for artificial nitrogenous fertilizer in the cereal crop.

Rotation also helps in weed control. It is difficult to control grass weeds in cereal crops because herbicides for grass weeds may also kill the crop. In the same way it is difficult to control broad-leaved weeds in legume crops. If the crops are rotated, however, herbicides can be used to control broad-leaved weeds during the cereal crop and grassy weeds during the legume crop. In this way neither type of weed gains a hold on the land.

An example of a herbicide which can be used for broad/leaved weeds is atrazine in maize and sorghum. Trifluralin in soybeans or peanuts, and penoxalin in maize or peanuts will help to control grassy weeds.

Herbicide left over in the soil from the first crop may be dangerous to the second when two crops a year are grown but if only one crop is taken each year there should be little trouble.

On slopes, contouring should be used to stop soil and moisture being lost from the land. Where slopes are steeper than 1%, a pasture phase may be necessary in the rotation to maintain long term productivity. On soils which are gravelly, seasonally wet, or swampy, cropping is not recommended at all and permanent pasture with careful grazing would be best.

While the use of cropping patterns allows flexibility in meeting market demands, stocks of seed, fertilizer and pesticide must be readily available. This is not the case at present and delays in sowing are due as much to problems in getting seed as to bad weather.