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Poduction and problems of rice in Surinam — A. H. van Dijk

Rice is the most important crop in Surinam. In the western part of the country it is almost the only source of cash-crop income. The total production in 1966 was 98 259 tons of wich 67.998 tons were produced in Nickerie. The average production of rough rice in 1966 was 3.950 kg/ha for the small holdings and 3.400 kg/ha for larger (mechanized) farms. The District of Surinam, which is the second largest producing area, produced about 15.856 tons with an average of 2.660 kg/ha.
The commercially important rice areas comprises 29.350 ha of which 60% is handplanted. The other 40% of the land is in use for modern highly mechanized rice farming.

Data on acreage and production of the major producing areas are presented in table 1.

Table 1 — **Acreage in ha and production in tons of the major rice producing areas in Surinam over the last 5 years**

Area	Acreage (ha)				
	1962	1963	1964	1965	1966
Nickerie	16,500	17,392	17,197	18,884	18,663
Coronie	220	254	203	180	332
Saramacca	2,538	2,205	2,485	2,264	2,479
Suriname	5,651	5,802	7,291	5,826	5,959
Commewijne	2,116	1,824	2,938	2,108	1,879
Marowijne	46	36	163	49	38
Area	Production (tons)				
Nickerie	55,586	55,344	59,430	66,925	67,998
Coronie	686	574	587	599	1,233
Saramacca	7,563	5,402	6,635	6,869	8,503
Suriname	10,201	10,444	15,778	11,645	15,856
Commewijne	5,036	2,991	5,259	3,694	4,597
Marowijne	89	89	274	93	72

The problems discussed in this paper are more related to the small holdings where the transplanting method is practised and despite of many years of research several major problems exist. Not only because much land is unsuited to cultivation due to lack of possibilities for irrigation, but also because management practices had not been improved.

Chandler (1963) stated that with productive soils, and with the use of varieties possessing a high yield potential and with relative freedom from diseases, insects, weeds and unfavourable weather conditions yields over 5000 kg/ha should always be possible, when yields are less than that something is wrong.

FACTORS THAT EFFECT YIELDS

Varieties

New improved varieties of rice that produce higher yields are continually being developed. Experimental tests indicated that the improved varieties produced higher yields than the common (standard) varieties. Some of the results of these experiments are illustrated in table 2.

Table 2 — **Production in kg/ha of 1 local variety and 2 improved varieties at different locations**

Experiment No.	Local variety	Improved varieties	
	Srivimankoti	SML-Washabo	SML-Temerin
VP 368	5800	7700	6600
VP 369	5500	5900	6200
VP 370	5600	5900	5800
VP 371	6400	7500	7200
VP 371..	4700	6900	6000
VP 373	4900	7400	6600

(Average of farmers in the same region 3900 kg/ha)

The average production of rice in the major rice growing areas over the last 5 years is presented in table 3.

Table 3 — **Average production of rice in kg/ha in major rice growing areas**

Year	Major rice regions			
	Nickerie	Coronie	Saramacca	Commewijne
1962	3370	3120	2980	2380
1963	3190	2260	2450	1650
1964	3460	2890	2670	1790
1965	3540	3330	3030	1750
1966	3640	3710	3440	2450

The fluctuation in annual yields is primarily because of adverse weather conditions. Lack of precipitation is probably the major factor. For example, in 1963 yield of rice was 2720 kg/ha planted. In 1966 a yield of more than 3300 kg/ha was produced. Considering that the low average yield in 1963 was the result of lack of rainfall, we may say that the national yield of rice has increased substantially. From several experiments we learnt, that the productive capacity is almost twice the average production of the farmer. Further increases in yields are therefore attainable. However, due to lack of sufficient seed of the improved varieties at one side and tradition of the farmer to grow their own variety at the other side, only about 20% of the acreage has been replaced by the improved varieties.

All the new varieties are shorter and have erect leaves, this growth habit permits greater light penetration and therefore simulates weed germination. The introduction of the new varieties must therefore go hand in hand with a better weed control.

Plantmaterial

Japan is one of the leading countries in rice production. Much emphasis is placed on good plantmaterial. The preparation of the nurseries, the seeding rate, age of the seedlings at planting time, and number of plants per hill are also factors of great importance. In the early season of 1967 an inquiry was conducted on seeding rate in nurseries in Nickerie. The results indicated that seeding rates varied from 150 to 300 grammes of seed per m^2, which is almost 3 to 6 times the amount recommended. The result of this very high seeding rate is that the plant material is weak and that 10 to 20 seedlings must be used per hill to obtain sufficient stand (the number of seedlings per hill recommended is 3 to 5). Very often the farmers have to postpone the transplanting of the seedlings to the field because of lack of water, and if it is too late for reseeding the farmers will have to use their overaged seedlings, which of course will also effect yield.

Spacing

Spacing of the seedlings in the field depend on variety and soil fertility. It is therefore difficult to predict uptimum specing rate. However, on the average we may expect that uptimum specing will not exceed 30 cm^2.
Many of our farmers plant to wide. Spacings of 35 cm^2 (and more) are frequent. This of course will effect the yield of the crop due to a reduction in plant population.

Soil preparation

Two types of cultivation methods exist in Surinam. Some farmers dry-cultivate their land in the period proceeding the rice season. A few days before planting, puddling is carried out to form a smooth layer of mud to facilitate hand planting.
This type of farming is usually applied in the district of Nickerîe. In the rest of the country puddling is the only method of cultivation. For both dry and wet cultivation a tractor drawn disc harrow is used. Usually a final levelling is given by pulling a heavy plank behind the disc.
Hasselbach and Van Amson (1965) indicated that dry tillage contributed considerably to yields of rice. The more so if tillage is deeper, finer and given not too shortly before the onset of the rice season.
Many farmers, especially in the district of Surinam use their rice fields for cattle grazing, and in spite of the positive effect on the yields, they postpone their tilling operations until a few days before planting.

Weed

It is estimated that 80% of the transplanted rice in Surinam is grown without weed control. Weed is therefore considered the most important limiting factor in the production of rice. The differences in yield between the experimental plots and the average yield on the farms (see table 2) was mainly the result of a better weed control.

Wouters (1963) estimated yield-losses at 500 kg/ha on badly infested fields.

Weeds of economic importance are **Fimbristylis miliacea, Ischaemum rogosum and Sphaenoclea zeylanica.** Weeds of minor importance are **Echinochloa cruspavonis and Nymphea amazona.**
The most widely used chemical weed control method is a mixture of 2,4-D and propanil. The favourable results of experiments with new chemicals, especially the granular formulations will also stimulate the use of chemicals for weed control in those regions where water cannot be drained from the field for the application of propanil and 2,4-D.

Water

Experiments conducted by Yamada (1965) showed remarkable decreases in yield due to water shortage at certain growth stages. It is also indicated that the quantity of weeds emergeable under submerged condition is less than one-third of that in upland state.
The greater part of our rice fields are raindependent and shortage of water frequently occurs. Some improvements were made in the irrigation system of Nickerie in 1965. Part of the increase in yield in 1966 is probably due to a better water supply.
In years when rainfall is low yields may fall far below national average (as was the case in 1963).

Lodging

Chandler (1963) indicated the serious losses in yields due to lodging and presented data obtained by Umali et al to prove that the earlier the lodging takes place the greater the reduction in yield. Lodging 2 weeks before heading time resulted in a decrease of 80% in yield. Yield losses when lodging occured at heading time and 2 weeks after heading were respectively 43% and 6%.
Since many of our varieties are very succeptable to lodging there is no doubt that lodging is the most limiting factor in yield in those places where other major factors influencing yields are absent.

Diseases

All the varieties grown in Surinam are to a certain extend succeptible to **Helminthosporium oryzae, Cercospora oryzae** and **Piricularia oryzae.** Helminthosporium is recognized as the most destructive disease and infection has been found to be very severe under poor growing conditions. Control can be obainted by application of fungicides. However, these are expensive and therefore not attractive to the farmer.

Insects

It is an accepted fact that the control of insects is essential for high grain production. At the present time much attention is given to the control of caterpillars. **(Laphygma frugiperda),** stinkbugs **(Tibraca limbativentris** and **Oebalus poecilus).**

Less attention is paid to other insects such as seedling flies **(Hydrellia** sp), delphacids **(Sogata orizicola),** Jassids **(Draeculacephala clypeata).**

Almost no attention is paid to reduction in yield caused by stemborers **(Diatraea saccharalis** and **Rupela albinella** and grasshoppers **Conocephalus** sp.) The same is true for losses caussed by rats and birds.

Fertilizers

Fertilizer use is not wide spread, although their application would be beneficial in some areas. At the other side the common varieties do not respond well to fertilizers.

Harvesting

The greater part of transplanted area is harvested by hand. Due to shortage of labour at harvesting time, the rice is usually harvested too late. If rice is not harvested on the exact time of maturity, the loss from shattering may be increased considerable, and, owing to the probability of cracking of the kernels, the yield of head rice (whole kernels) is also likely to be reduced.

Rice harvested by hand is usually left in the field for a couple of days before it is shocked .The alternate drying (by sun during the day) and wetting (by dew during the night) may also result in cracking of the kernels.
Heavy rainfall during the time that the rice is left in the field may result in germination of the grain which of course will cause considerable losses.

Climatic conditions

Factors as temperature, rainfall, sunlight, daylength and wind play an important role in rice production. They are however very difficult to control and therefore not discussed in this paper.

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