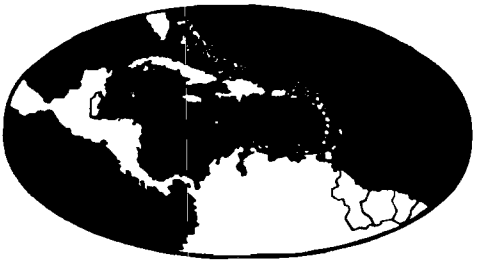
# CARIBBEAN FOOD CROPS SOCIETY



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# YIELD RESPONSES OF MAIZE (*ZEA MAYS* L.) IN NPK FERTILIZER TRIALS IN SOME ISLANDS OF THE COMMONWEALTH CARIBBEAN

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## SUMMARY

During the period 1966 - 1969, 70 NPK fertilizer trials using maize (*Zea mays* L.) as the test crop were laid down in Antigua, Montserrat, St. Kitts and Dominica. The aim of the programme was to provide enough basic information on the yield responses to fertilizer to enable satisfactory interpretation of soil and crop analytical data to be made.

Of the 70 experiments carried out on 16 soils in the four territories, significant yield responses to nitrogen, phosphorus and potassium were recorded at 16, 17 and two sites respectively. Of these, more nitrogen responses were obtained on the soils in Antigua and St. Kitts, while the greater number of increases to phosphorus were obtained on the soils in Dominica and Montserrat. Only one or two significant yield increases to potash were obtained in each island. Fertilizer recommendations for maize production were made on the basis of the 1969 results.

## INTRODUCTION

Upon completion of the soil surveys of the Territories of the Commonwealth Caribbean in the mid 1960's, a large regional field fertilizer programme was initiated in 1966 with the aim of providing enough basic information on the yield response to fertilizers by various crops on the important soils in each island.

During the period 1967 - 69, 70 NPK fertilizer trials using maize (*Zea mays* L.) were carried out on 16 soils in Antigua, Montserrat, St. Kitts and Dominica. In this paper, the yield data and responses to NPK fertilizers are reported and fertilizer recommendations for maize production based on the 1969 results are given.

## MATERIALS AND METHODS

### Soils

In each island at least three soils of major agricultural importance were selected and the experiments sited on these. The soils which have been mapped in a series of soil and land-use reports (Hill, 1966; Lang and Carroll, 1966; Lang, 1967 a; Lang, 1967 b) are listed in Table 1, along with mean values of physical and chemical properties of the surface soil (0 - 15 cm) at the sites of the field experiments. More detailed data and descriptions of the soils are given by Forde, Payne and Walmsley (1975).

### Experimental Details

In the 1967 and 1968 trials, the design was basically a $2^3$ factorial structure with additional treatments that allowed for the examination of the nutrients N, P and K at five levels. There were 17 treatments arranged in a completely randomised design with one replicate at each site. An additional nil plot was also included. In 1969, the design was modified, so that while retaining the $2^3$ factorial composite, each nutrient was examined at four levels and blocking introduced to provide a table of means free from bias due to differences in block effects. Each trial consisted of two replicates of 18 treatments arranged in four incomplete blocks.

In 1967 and 1968 plots consisted of 120 plants (population 28,690 per ha) arranged in six 7.6 m long rows with the plants spaced 90 cm x 38 cm. The net plot consisted of 64 plants taken from the inside four rows after discarding two plants from the ends of each row.

In 1969, the plots consisted of 96 plants (population 30,860 per ha) in six 4.9 m long rows spaced 90 cm x 30 cm. The net plot was comprised of the 48 plants taken from the inside four rows.

Seeding with the hybrid maize (*Zea mays* L.) cultivar Pioneer X 303 was at the rate of three seeds per hole with thinning to one plant per hole after plants were 21 days old.

Weeds were controlled using a pre-emergence spray of Atrazine at 2.25 kg per ha together with Grammoxone at 1.7 L. per ha. Subsequently hand-weeding was performed as necessary. Adequate control of insects was achieved by spraying with Sevin W80 (Carbaryl) at the rate of 2.25 kg per ha at intervals of 10 days throughout the life of the crop.

Table 1: Mean view of physical and chemical properties of the surface soil at the sites of the field experiments

| Island | Soil name | Tentative soil class | pH | Elec. cond. mhos x $10^{-6}$ | % oven dry soil | | | | me per 100g % oven dry soil | | | | | Base Sat[a] % | P Truog ppm | C % | N % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Coarse sand (2-0.2 mm) | Fine sand (0.2-0.05 mm) | Silt (0.05-0.002 mm) | Clay (<0.002 mm) | C.E.C. | Ca | Mg | K | Na | | | | |
| Antigua | Blubber Valley | Cumulic Haplustolls | 6.8 | 125 | 16 | 33 | 21 | 35 | 23.0 | 23.2 | 9.2 | 0.73 | 0.91 | 100 | 94 | 1.5 | 0.17 |
| | Fitches | Typic Calciustolls[1] | 7.6 | 142 | 11 | 22 | 9 | 61 | 43.1 | ND | 6.1 | 0.82 | 0.84 | 100 | 17 | 1.8 | 0.21 |
| | Gunthorpes | Ulic Chromusterts[2] | 7.6 | 156 | 10 | 21 | 11 | 59 | 47.1 | ND | 7.9 | 0.74 | 1.36 | 100 | 31 | 1.9 | 0.28 |
| Dominica | Boetica | Entic Dystrandepts | 5.1 | 239 | 15 | 37 | 22 | 23 | 23.5 | 2.9 | 1.1 | 0.40 | 0.22 | 19 | 4 | 6.3 | 0.53 |
| | Chilen Beau | Entic Dystrandepts | 4.7 | 181 | 6 | 30 | 21 | 42 | 35.9 | 2.9 | 1.4 | 0.47 | 0.27 | 18 | 7 | 4.3 | 0.69 |
| | Espagnol | Typic Durustolls | - | 87 | ND | ND | ND | ND | 8.5 | 6.8 | 2.8 | 0.50 | 0.20 | 100 | 7 | ND | ND |
| | Gleau | | 5.3 | 95 | 29 | 30 | 26 | 17 | 20.4 | 4.8 | 1.9 | 0.57 | 0.29 | 37 | 19 | 3.4 | 0.39 |
| | La Plaine | Udic Durandepts | 5.4 | 141 | 20 | 24 | 32 | 27 | 19.3 | 5.3 | 3.1 | 0.49 | 0.36 | 48 | 5 | 3.3 | 0.33 |
| | Woodford Hill | Typic Tropudults | 5.7 | 132 | 9 | 10 | 17 | 56 | 17.1 | 7.0 | 3.4 | 1.20 | 0.46 | 73 | 4 | 2.9 | 0.31 |
| Montserrat | Amersham | Typic Tropudalfs | 5.9 | 103 | 16 | 34 | 32 | 20 | 10.1 | 6.5 | 2.7 | 0.42 | 0.45 | 100 | 13 | 1.5 | 0.17 |
| | Grove | Typic Ustipsamments | 6.5 | 98 | 29 | 37 | 20 | 14 | 6.9 | 5.3 | 1.8 | 0.45 | 0.26 | 100 | 77 | 1.0 | 0.10 |
| | Riley's | Typic Tropudalfs | 5.7 | 136 | 13 | 35 | 33 | 21 | 10.2 | 5.5 | 2.7 | 0.35 | 0.40 | 88 | 8 | 1.4 | 0.15 |
| St. Kitts | Golden Rock | Mollic Vitrandepts | 6.5 | 162 | ND | ND | ND | ND | 11.3 | 7.3 | 3.3 | 1.08 | 0.23 | 100 | 280 | ND | ND |
| | Mansion | Typic Tropudalfs | 5.3 | 109 | 43 | 25 | 16 | 18 | 9.7 | 3.1 | 0.9 | 0.61 | 0.18 | 49 | 22 | 2.6 | 0.22 |
| | Sandy Bay | Mollic Vitrandepts | 5.5 | 122 | 41 | 33 | 17 | 16 | 10.0 | 4.5 | 1.5 | 0.56 | 0.19 | 67 | 65 | 2.4 | 0.19 |
| | Shadwell | Mollic Vitrandepts | 5.8 | 158 | 46 | 26 | 14 | 14 | 9.4 | 4.9 | 1.8 | 0.42 | 0.17 | 77 | 144 | 3.0 | 0.20 |

1 10.0% Free $CaCO_3$ 2 3.1% Free $CaCO_3$ ND = Not determined

The fertilizer treatments are summarised in Table 2. In the 1967 series of experiments the fertilizers were applied on the soil surface in bands 7.5 cm from the plants when they were four weeks old. In the 1968 and 1969 trials, the fertilizer treatments were given in a single application immediately after planting in bands 7.5 cm to one side of the seed row and then covered with soil.

Plot yields were calculated as the weight of shelled grain at 15.5 percent moisture using a standard procedure (Forde, *et al.*, 1975).

**TABLE 2. Nutrients applied (kg/ha) in the field trials with maize**

| Nutrient | Fertilizer | Year | Level | | | | |
|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 |
| N | Ammonium sulphate | 1967/68 | 0 | 11 | 45 | 79 | 90 |
| | | 1969 | 0 | 67 | 134 | 241 | - |
| P | Triple *superphosphate | 1967/68 | 0 | 3 | 13 | 23 | 26 |
| | | 1969 | 0 | 29 | 58 | 87 | - |
| K | Potassium chloride | 1967/68 | 0 | 13 | 51 | 89 | 102 |
| | | 1969 | 0 | 56 | 112 | 168 | - |

* In 1967 P was applied as single superphosphate

## RESULTS AND DISCUSSION

### Variations in yield of grain

In Table 3, the maximum, minimum and mean yields of grain from the different sites are shown. Over the three year period 1967 - 69 themean yield of grain varied from 1.21 t/ha at one site in Antigua to 4.69 t/ha at a site in Dominica. Generally, average yields were better in St. Kitts and Dominica, with Antigua recording the lowest mean yields.

The intra-site variations in production was no doubt due mainly to differences in soil types and climate. The 1969 yields were generally higher than those of the two earlier years, and this increase probably arose from the increased planting density and higher fertilizer rates used in 1969.

TABLE 3. Maximum, minimum and mean yields of grain from the different soils in (tonnes/ha 15.5% moisture)

| Soil Series | 1967 | | | 1968 | | | 1969 | | | Overall Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | Max | Min | Mean | Max | Min | Mean | Max | Min | Mean | |
| **Antigua** | | | | | | | | | | |
| Blubber Valley | 0.98 | 0.53 | 0.69 | 2.98 | 0.13 | 1.66 | 4.36 | 2.36 | 3.61 | 2.15 |
| Gunthorpes | 1.30 | 0.99 | 0.52 | | | | 2.48 | 1.12 | 1.90 | 1.21 |
| Fitches | | | | | | | 3.33 | 0.97 | 2.32 | 2.32 |
| **Montserrat** | | | | | | | | | | |
| Riley's | 3.78 | 1.04 | 2.58 | | | | 3.78 | 1.19 | 2.38 | 2.48 |
| Amersham | 5.07 | 0.40 | 2.95 | | | | 5.17 | 1.12 | 3.29 | 3.12 |
| Grove | | | | | | | 1.11 | 0.43 | 0.78 | 0.78 |
| **St. Kitts** | | | | | | | | | | |
| Shadwell | 2.45 | 0.96 | 1.76 | 2.98 | 0.13 | 1.66 | 4.16 | 1.75 | 3.11 | 2.18 |
| Sandy Bay | 2.75 | 1.72 | 3.74 | 5.21 | 1.51 | 2.94 | 4.31 | 0.97 | 2.64 | 3.11 |
| Mansion | 4.36 | 0.70 | 2.64 | 3.88 | 1.39 | 2.75 | 4.65 | 1.40 | 2.83 | 2.74 |
| | | | | | | | 3.29 | 1.69 | 2.77 | 2.77 |
| **Dominica** | | | | | | | | | | |
| Chilen Beau | 2.68 | 0.16 | 1.03 | 3.13 | 0.32 | 2.06 | | | | 1.54 |
| Woodford Hill | 2.27 | 0.18 | 1.30 | 2.66 | 0.29 | 1.54 | 3.98 | 0.30 | 2.10 | 1.65 |
| La Plaine | 1.78 | 0.68 | 1.20 | 2.95 | 0.76 | 1.95 | 3.98 | 1.53 | 2.82 | 1.99 |
| Boetica | 3.62 | 0.77 | 2.24 | 3.84 | 0 | 1.55 | 5.80 | 2.49 | 4.21 | 2.6 2.67 |
| Espagnol | | | | | | | 11.05 | 1.66 | 4.69 | 4.69 |
| Gleau | 3.28 | 1.83 | 5.03 | | | | | | | |

In Antigua, the best yields were recorded on the Blubber Valley soil series with an average yield of 3.61 t/ha grain in 1969. In Montserrat the best performance was recorded on the Amersham soil series (3.29 t/ha) while very low yields were obtained on the Grove series. There was not much variation in yield among the soils of St. Kitts. In Dominica, the highest mean yields were obtained on the Boetica soil series in a consistent manner.

In a similar programme of experiments carried out on some soils in the Eastern Caribbean, similar observations were made with respect to intra-site and at 15.5 percent moisture (Baynes and Walmsley, 1973). Thus, the levels of yield obtained in the wetter islands of the Windward group were consistently higher than those in the Leeward group. Similarly, in fertility studies with the same cultivar (pioneer X 304) in Guyana, both Chesney (1969) and Shukla (1972) obtained mean yields ranging from 2.0 to 4.0 t/ha grain at about 12 percent moisture. It would thus seem that allowing for differences in climate and soil the performance of this cultivar in trials throughout Guyana and the Commonwealth Caribbean was essentially the same.

However, in fertilizer trials carried out in other parts of the tropics and the Southern United States, the reported mean yields were generally two-to-three times higher than those that were obtained in the islands of the Eastern Caribbean.

In a study of interrelationships of phosphorus, zinc, boron and plant population on yield of maize, Ahmad (1970) found grain yields to vary from 9.69 to 14.43 t/ha with populations ranging from 40,000 - 93,000 plants per hectare.

Johnson *et al.* (1953) reports the average yield of 220 farmers in Georgia, as 7.04 t/ha from hybrid maize fertilized at an average rate of 84.5 lb N; 60 lb $P_2O_5$ lbs $K_2O$ and an average plant density of 12,000 plants per acre (30,000 plant per ha).

**Yield response to N, P and K fertilizers**

In Tables 4, 5, 6 and 7, the effects of applied N, P and K fertilizers on yield of grain are shown. In Antigua (Table 4) the most important result was the significant yield increases obtained with the application of nitrogen fertilizer in five out of the ten experiments conducted. Both phosphate and potash had no beneficial effects on yield.

In Montserrat (Table 5), out of the 14 trials carried out, there were very few significant yield increases due to N, P and K fertilizers and the same was true in St. Kitts (Table 6) where of the 22 experiments

TABLE 4. Grain yield response to N, P and K fertilizers in t/ha (15.5% moisture) on some soils in Antigua

| Soil Series | Year | Site | Yield in t/ha 15.5% moisture | | | | | | CV |
|---|---|---|---|---|---|---|---|---|---|
| | | | $N_0$ | $N_2$ | $P_0$ | $P_2$ | $K_0$ | $K_2$ | |
| Blubber Valley | 1967 | Belvedere | 0.58 | 0.71* | 0.88 | 0.62*(—) | 0.60 | 0.71*(—) | 0.2 |
| | 1969 | Orange Valley | 2.66 | 3.02 | 2.55 | 3.12 | 2.97 | 2.71 | 25.1 |
| | | Claremonte | 3.65 | 4.57** | 4.30 | 3.93*(—) | 4.19 | 4.04 | 5.1 |
| Fitches | 1969 | Dunbars | 1.66 | 2.75*** | 2.05 | 2.36 | 2.54 | 1.87*(—) | 15.0 |
| | | L. Friars Hill | 1.44 | 3.22*** | 2.12 | 2.54 | 2.47 | 2.19 | 20.6 |
| | | Thibou's | 1.46 | 1.98 | 1.75 | 1.69 | 1.80 | 1.64 | 37.1 |
| Gunthorpe's | 1967 | Clare Hall | 1.11 | 0.92 | 0.60 | 0.94 | 0.87 | 0.93 | 29.2 |
| | 1969 | Woods | 2.44 | 3.42 | 2.10 | 2.76* | 2.70 | 2.16*(—) | 16.6 |
| | | Clare Hall | 1.34 | 1.05 | 1.12 | 1.27 | 1.19 | 1.20 | 22.9 |
| | | North Sound | 1.30 | 1.65* | 1.34 | 1.61 | 1.54 | 1.42 | 22.3 |

* Significant at 5% level of probability

** Significant at 1% level of probability

*** Significant at 0.1% level of probability

(—) Negative

TABLE 5. Grain yield response to N, P and K fertilizers in t/ha (15.5% moisture) on some soils in Montserrat.

| Soil Series | Year | Site | Yield in t/ha 15.5% moisture | | | | | | CV |
|---|---|---|---|---|---|---|---|---|---|
| | | | $N_0$ | $N_2$ | $P_0$ | $P_2$ | $K_0$ | $K_2$ | |
| Amersham | 1967 | Amersham | 1.39 | 2.58 | 1.38 | 2.47 | 2.45 | 2.45 | 24.3 |
| | | Lees | 3.59 | 3.67 | 3.99 | 3.89 | 2.36 | 4.02*** | 0.9 |
| | | Paradise | 2.54 | 2.69 | 1.19 | 2.94 | 3.08 | 2.75 | 18.0 |
| | 1969 | Amersham | 2.26 | 2.53 | 1.92 | 2.87 | 2.47 | 2.32 | 34.8 |
| | | Lees | 2.67 | 3.76** | 2.55 | 3.87** | 3.43 | 2.99 | 19.9 |
| | | Paradise | 2.83 | 2.53 | 1.57 | 3.78** | 2.60 | 2.76 | 29.5 |
| Riley's | 1967 | Galways | 2.11 | 1.77 | 3.02 | 1.83 | 2.02 | 1.76 | 40.5 |
| | | Farrells | 3.24 | 3.47 | 2.75 | 3.45 | 3.11 | 3.41 | 2.2 |
| | | Brodericks | 2.01 | 2.39 | 2.63 | 2.20 | 2.00 | 2.75 | 33.8 |
| | 1969 | Galways | 2.38 | 2.65 | 2.18 | 2.86** | 2.90 | 2.14*(-) | 8.8 |
| | | Farrells | 2.47 | 2.51 | 2.53 | 2.45 | 2.62 | 2.26 | 36.1 |
| | | Brodericks | 1.36 | 1.83 | 1.39 | 1.80 | 1.50 | 1.69 | 45.6 |
| Grove | 1969 | Trants | 0.81 | 0.56*(-) | 0.70 | 0.67 | 0.72 | 0.65 | 28.2 |
| | | Gingoes | 0.96 | 1.06 | 1.06 | 0.96 | 1.02 | 1.00 | 43.2 |

For * See TABLE 1.

**TABLE 6. Grain yield responses to N, P and K fertilizers in t/ha (15.5% moisture) on some soils in St. Kitts.**

| Soil Series | Year | Site | Yield in t/ha 15.5% moisture | | | | | | CV |
|---|---|---|---|---|---|---|---|---|---|
| | | | $N_0$ | $N_2$ | $P_0$ | $P_2$ | $K_0$ | $K_2$ | |
| Shadwell | 1967 | Stapleton | 1.67 | 1.75 | 2.37 | 1.59*(-) | 1.76 | 1.66 | 3.0 |
| | | Shadwell | 1.71 | 1.75 | 2.50 | 1.69 | 1.77 | 1.82 | 24.8 |
| | 1968 | Stapleton | 0.13 | 1.51 | 1.32 | 1.34 | 1.93 | 1.26 | 47.7 |
| | 1969 | Stapleton | 2.27 | 3.62*** | 2.88 | 3.01 | 2.86 | 3.02 | 16.0 |
| | | Shadwell | 1.67 | 3.31*** | 2.10 | 2.88** | 2.18 | 2.80* | 15.6 |
| | | West Farm | 2.57 | 2.91 | 2.14 | 3.34*** | 2.18 | 2.67 | 16.7 |
| Golden Rock | 1969 | Ponds | 2.97 | 2.59 | 2.61 | 2.92 | 2.84 | 2.71 | 21.0 |
| Sandy Bay | 1967 | Mansion | 2.83 | 3.34 | 3.30 | 3.38 | 4.07 | 3.22 | 10.6 |
| | | Molineaux | 2.10 | 2.44 | 2.60 | 2.40 | 2.23 | 2.44 | 19.9 |
| | | Estridge | 3.36 | 2.69 | 3.28 | 3.10 | 3.44 | 2.79 | 29.6 |
| | 1968 | Mansion | 3.33 | 2.92 | 4.38 | 2.91 | 1.43 | 3.17 | 9.1 |
| | | Molineaux | 2.85 | 3.01 | 3.23 | 2.96 | 1.61 | 3.00 | 26.2 |
| | | Estridge | 3.36 | 2.60 | 3.25 | 2.79 | 2.37 | 2.79 | 38.3 |
| | 1969 | Estridge | 2.19 | 3.84*** | 3.41 | 2.62*(-) | 3.24 | 2.78 | 11.8 |
| | | Molineaux | 2.27 | 2.01 | 2.17 | 2.12 | 2.40 | 1.88 | 53.5 |
| Mansion | 1967 | Lodge | 1.89 | 1.71 | 1.69 | 1.86 | 1.66 | 1.73 | 26.0 |
| | | Molineaux | 1.36 | 3.95 | 4.29 | 3.04 | 3.50 | 3.18 | 38.8 |
| | 1968 | Lodge | 0.87 | 1.94 | 2.38 | 1.60 | 1.43 | 1.86 | 14.5 |
| | | Brighton | 4.02 | 3.44 | 2.12 | 3.60 | 4.14 | 3.07 | 24.7 |
| | 1969 | Lodge | 1.74 | 3.28*** | 1.81 | 3.22 | 2.45 | 2.57 | 28.2 |
| | | Molineaux | 2.54 | 3.53* | 3.06 | 3.01 | 3.39 | 2.68 | 27.0 |
| | | Brighton | 1.28 | 2.18 | 0.89 | 2.57*** | 1.91 | 1.55 | 32.5 |

For * See TABLE 1.

TABLE 7. Grain yield response to N, P and K fertilizers in t/ha (15.5% moisture) on some soils in on some soils in Dominica.

| Soil Series | Year | Site | Yield in t/ha 15.5% moisture | | | | | | CV |
|---|---|---|---|---|---|---|---|---|---|
| | | | $N_0$ | $N_2$ | $P_0$ | $P_2$ | $K_0$ | $K_2$ | |
| Chilen beau | 1967 | Layou Park | 1.19 | 1.00 | 0.36 | 1.40 | 1.75 | 1.09 | 73.0 |
| | 1968 | Layou Park | 1.13 | 2.10** | 0.31 | 2.22* | 2.60 | 1.93 | 23.7 |
| Gleau | 1967 | Shawford | 3.17 | 2.97 | 2.12 | 3.30 | 1.97 | 2.99 | 31.5 |
| Espagnol | 1969 | Grande Savanne North | 3.34 | 3.91 | 2.49 | 4.76** | 3.38 | 3.88 | 16.5 |
| Woodford Hill | 1967 | Hodges | 3.00 | 2.03 | 0.20 | 2.37*** | 1.58 | 2.04 | 34.6 |
| | | Londonderry | 0.50 | 0.33 | 0.17 | 0.36 | 0.33 | 0.37 | 16.2 |
| | 1968 | Hodges | 1.58 | 2.66* | 2.20 | 2.50 | 3.09 | 2.44 | 20.1 |
| | | Londonderry | 0.30 | 0.34 | 0.43 | 0.37 | 0.16 | 0.27 | 98.4 |
| | | Melville Hall | 2.40 | 1.92 | 0.18 | 2.02*** | 2.45 | 1.79 | 34.2 |
| | 1969 | Hodges | 1.42 | 1.43 | 0.19 | 2.67*** | 1.32 | 1.53 | 44.6 |
| | | Londonderry | 1.63 | 2.07 | 1.29 | 2.41 | 1.87 | 1.83 | 47.5 |
| | | Melville Hall | 1.86 | 1.68 | 1.52 | 2.02 | 1.96 | 1.58 | 38.4 |
| La Plaine | 1967 | Quayaneri | 0.92 | 1.18 | 1.14 | 1.20 | 1.71 | 1.11 | 41.0 |
| | 1968 | Quayaneri | 0.88 | 1.60 | 0.62 | 1.63 | 0.78 | 1.71 | 41.9 |
| | | Felicite | 2.18 | 2.24 | 0.90 | 2.42*** | 1.95 | 2.22 | 15.1 |
| | 1969 | Felicite | 2.78 | 2.40 | 2.22 | 2.95 | 2.76 | 2.42 | 32.4 |
| | | La Plaine | 2.09 | 2.57* | 2.42 | 3.23 | 2.86 | 2.80 | 45.9 |
| Boetica | 1967 | Belle Vue Chopin | 0.53 | 1.99 | 1.81 | 1.78 | 2.44 | 1.82 | 24.0 |
| | | Giraudel | 2.05 | 2.80 | 1.92 | 3.12 | 2.93 | 2.96 | 35.8 |
| | 1968 | Belle Vue Chopin | 0.91 | 1.61 | 0 | 1.96 | 1.40 | 1.84 | 63.5 |
| | | Giraudel | 0.64 | 1.67 | 0.23 | 1.91 | 0 | 1.96 | 107.6 |
| | 1969 | Belle Vue Chopin | 4.53 | 5.18* | 4.76 | 4.95 | 4.95 | 4.76 | 8.2 |
| | | Giraudel | 4.57 | 4.63 | 3.79 | 5.41* | 5.37 | 3.83 | 32.7 |
| | | Lisdara | 2.46 | 2.86 | 2.10 | 3.22* | 2.48 | 2.84 | 27.5 |

For * See TABLE 1.

conducted, there were six, four and one responses to N, P and K respectively. Similarly in Dominica, of the 24 trials carried out, there were four significant responses to N and eight to P.

Of the 70 trials conducted on 16 different soil types in the four islands, significant yield increases to nitrogen, phosphorus and potassium were recorded at 16, 17 and two sites respectively. Of these, more nitrogen responses were obtained on the soils in Antigua and St. Kitts, while the greater number of responses to phosphorus were obtained on the soils in Dominica and Montserrat. Only one or two significant yield increases to potash were obtained in each island.

**Fertilizer Recommendations**

In the 1969 series of trials the yields were higher and more responses to added fertilizer were obtained. This was no doubt due to the higher rates at which fertilizers were applied and the increased planting density. More favourable climatic conditions could also have been a contributing factor. These data were considered to be more reliable than those of the 1967 - 68 series and were used as a basis for making fertilizer recommendations.

The mean effects of fertilizer treatments on yield of grain for each soil are shown graphically in Figs. 1, 2, 3 a & b and 4 a & b. From these graphs estimates of suitable fertilizer treatments were made and the suggested recommendations are presented in Table 8.

**TABLE 8. Recommended N, P and K fertilizer rates for some soils of Antigua, Montserrat, St. Kitts and Dominica.**

| Island | Soil Series | Soil Survey No. | Fertilizer rates in kg/ha | | |
|---|---|---|---|---|---|
| | | | N | P | K |
| Antigua | Blubber Valley | 12 | 100 | 25 | 50 |
| | Fitches | 21 | 100 | 25 | 50 |
| | Gunthorpes | 40 | 50 | 25 | 50 |
| Montserrat | Grove | 15 | 25 | 25 | 25 |
| | Amerstam | 17 | 50 | 80 | 25 |
| | Riley's | 20 | 50 | 25 | 50 |
| St. Kitts | Shadwell | 5 | 50 | 25 | 50 |
| | Golden Rock | 6 | 25 | 25 | 25 |
| | Sandy Bay | 8 | 200 | 0 | 0 |
| | Mansion | 15 | 50 | 75 | 50 |
| Dominica | Woodford Hill | 29 | 50 | 75 | 50 |
| | Espagnol | 53 | 150 | 25 | 150 |
| | La Plaine | 56 | 100 | 50 | 25 |
| | Boetica | 57 | 50 | 75 | 25 |

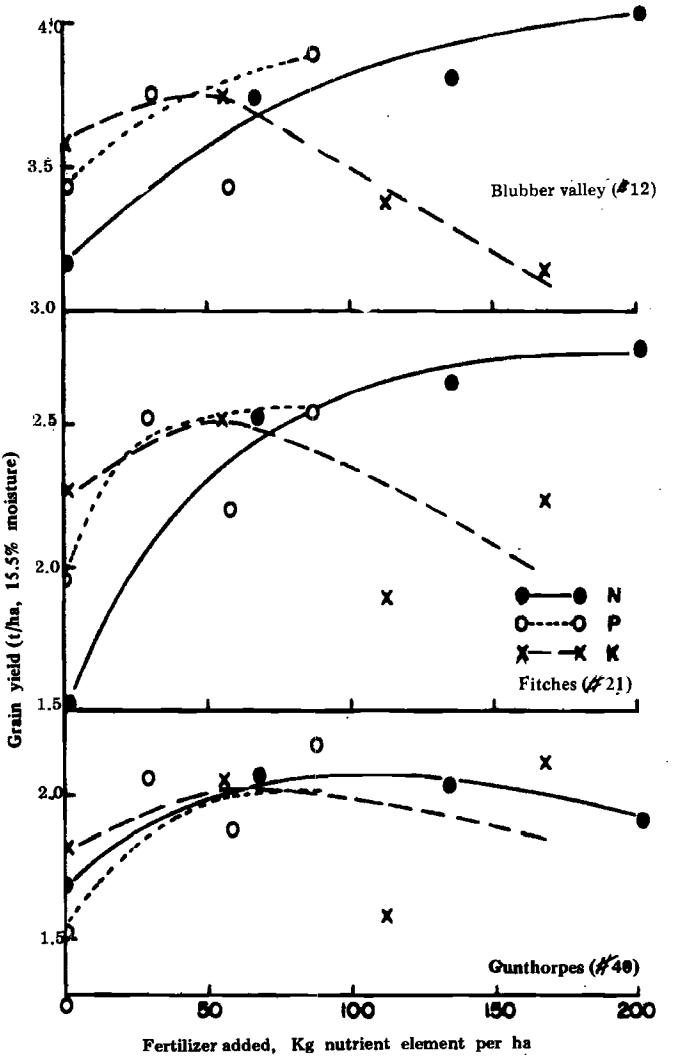


**Fig. 1. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in Antigua.**

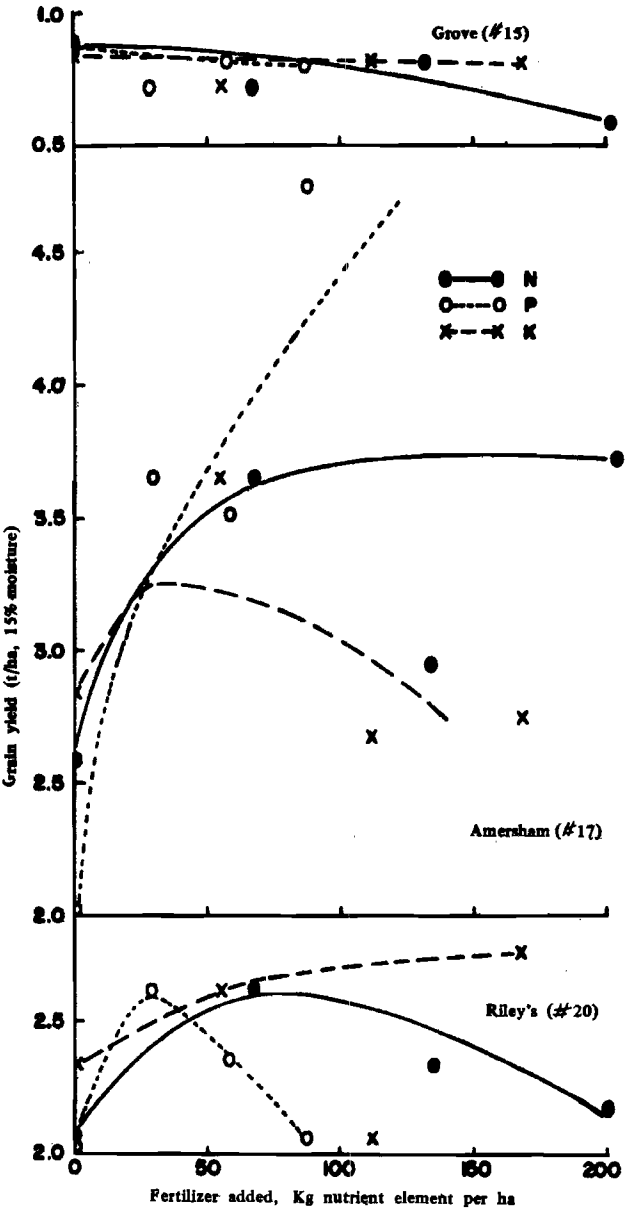


Fig. 2. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in Montserrat.

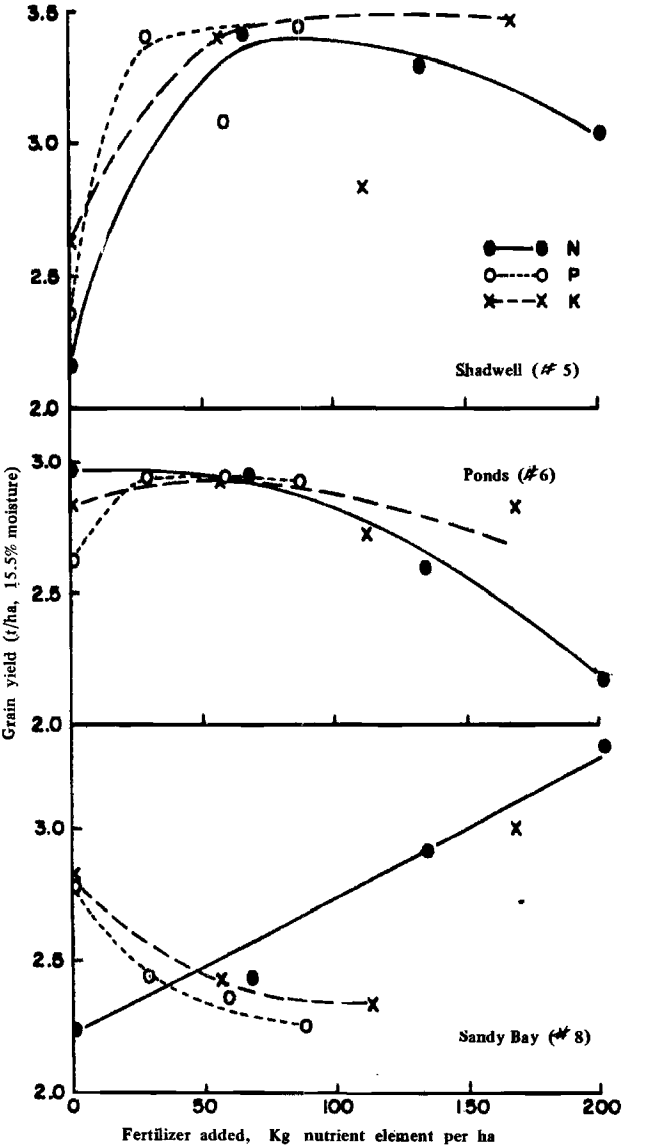


Fig. 3a. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in St. Kitts.

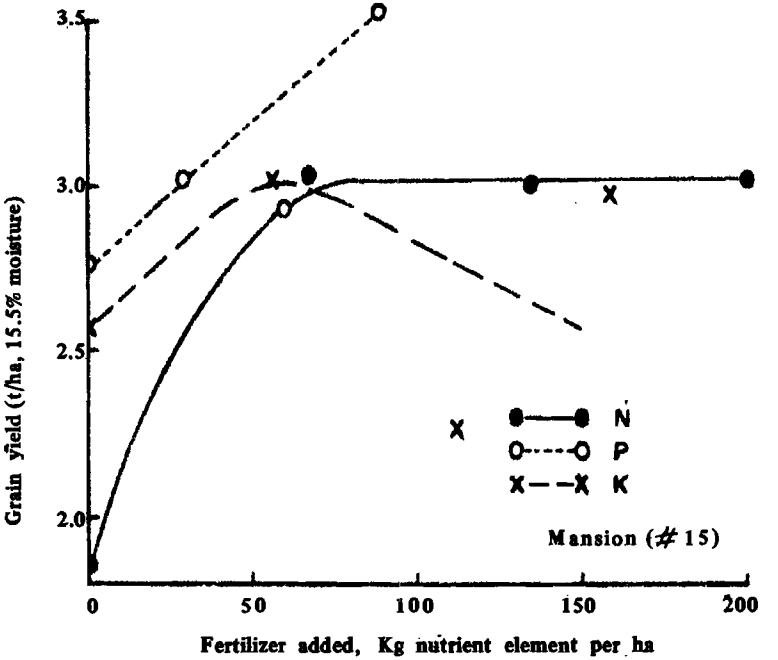


Fig. 3b. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in St. Kitts.

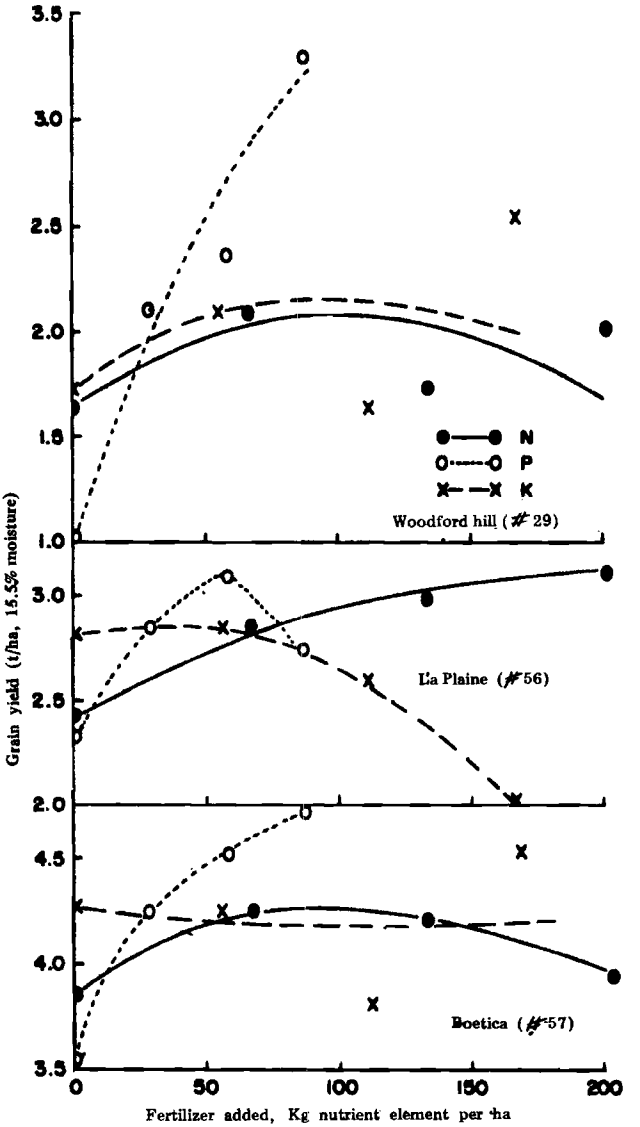


Fig. 4a. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in Dominica.

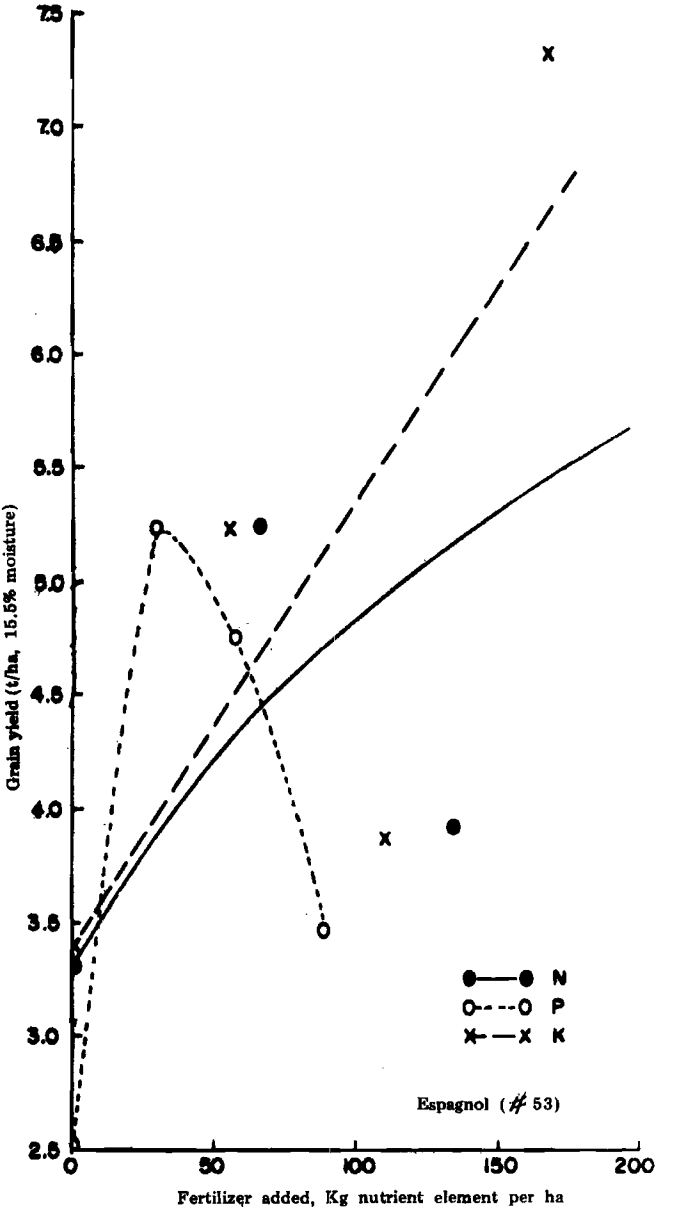


Fig. 4b. Influence of different rates of N, P and K fertilizer on mean grain yield of maize in Dominica.

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