

# EFFECTS OF PLANT POPULATION AND FERTILIZERS ON YIELD AND YIELD COMPONENTS OF CASSAVA IN THE FOREST ZONE OF GHANA

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## SUMMARY

Under the soil moisture conditions of experiments carried out at Kumasi, Ghana, comparing cassava yields at five densities over the range 9259 to 74,074 per hectare, 18,500 plants per hectare increased yields; plant densities higher than this resulted in a drop in yield. Water supply was probably limiting yield since the crop did not respond to fertilizers even at high density except by increased top growth. Yield per plant, average tuber weight, weight of tops, average number of stems and tubers/plant were not affected by fertilizers, but they all decreased with an increase in plant population beyond 18,500.

## RESUME

Des essais menés en conditions d'humidité du sol à Kumasi, Ghana, comparant des rendements du manioc de cinq densités partant de 9259 à 74.074 à l'hectare, ont révélé que 18.500 plants à l'hectare ont accru le rendement; des densités plus élevées entraînent une baisse de rendement. L'approvisionnement en eau limitait probablement le rendement dans la mesure où la plante en répondait pas aux engrais, même quand la densité est élevée, sauf au niveau de la croissance de la tige. Les engrais n'ont pas eu d'effet sur le rendement par plant, le poids moyen des tubercules, le poids des tiges, le nombre moyen des tiges et tubercules par plant, mais il y a eu baisse à tous les niveaux lorsque la densité dépassait 18.500.

## RESUMEN

Bajo las condiciones de humedad del suelo en experimentos conducidos en Kumasi, Ghana, los rendimientos de yuca aumentaron hasta densidades de siembra de 18,500 plantas por hectárea, dentro del rango de comparación que fué de 9,259 hasta 74,074 plantas por hectárea; densidades mayores a 18,500 redujeron el rendimiento. El abastecimiento de agua limitó probablemente el rendimiento ya que no se observó respuesta a los fertilizantes aún con densidades altas, excepto en lo referente a crecimiento de la parte aérea. El rendimiento por planta, el peso promedio de tubérculos, peso de parte aérea, número promedio de tallos y tubérculos/planta no fueron afectados por el fertilizante sino que decrecieron — todos ellos — con un incremento en población mayor a 18,500 plantas por hectárea.

## REVIEW

Half the area of cassava production in Ghana is grown in the Forest Zone. Cassava is usually planted as an opening crop, interplanted with maize and cocoyams, after a fallow of secondary forest (Doku<sup>8</sup>). Although it is an important staple food, so little work had been done on the agronomy of cassava the Doku<sup>8</sup> could write "There are no records of experiments aimed at finding the best spacing, but somehow a 3 x 3 ft spacing has been accepted throughout the country as the best." Since then Koli<sup>12</sup> has conducted spacing and fertilizer trials throughout the country. Jennings<sup>11</sup> reviewed work on cassava in Africa.

In Senegal, Tardieu and Fauche<sup>16</sup> obtained highest yields with a population of 10,000 plants/ha, (1 x 1m). The Department of Agriculture Zanzibar<sup>7</sup> recorded highest yields with 11,900 plants/ha (3 x 3 ft), but in Argentina, Rodriguez *et al.*<sup>14</sup> recommended much higher populations of 13,300 to 20,000 plants/ha (1 x 0.75m or 1 x 0.5 m).

Yields of cassava can be increased by the use of green manure (Childs<sup>3</sup>; Doku<sup>8</sup>; Silvestre<sup>15</sup>) or farm yard manure (Briant<sup>2</sup>). Cours and Fritz<sup>4</sup> estimated that a 40 tonnes/ha. crop removes 85,62, 280 and 75 kg/ha each of N,P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O and CaO respectively. In field experiments cassava responds most to potash and phosphate (Tardieu and Fauche<sup>16</sup>; Doku<sup>8</sup>). De Geus<sup>6</sup> cited instances of responses to nitrogen but also evidence that too high a rate of nitrogen application may promote stem and leaf growth at the expense of root growth. Compound fertilizers have given good responses in a number of trials (FFHC<sup>9</sup>; Cours *et al.*<sup>4</sup>; Tardieu and Fauche<sup>16</sup>). A satisfactory ratio for N,P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O is very important and De Geus<sup>6</sup> concluded that on the evidence available a ratio of 1:1:2 could generally be recommended. The optimum ratio

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