(main season crop) followed by cowpea (minor season crop) annual rotation was practiced during the last 6 years. Though P and N responses on the sandy loam Egbeda soil were observed, respectively, since the first and third years following land clearing, a significant response to K application on the maize crop was not observed until 1980, the ninth year after land clearing (Fig. 20).

The significant response to an annual application of 40 kg K/ha was rather unexpected since the soil K-status with this treatment at the start of the trial in 1980 was more than adequate at 0.32 me K/100g soil (Fig. 21). This may result from an early drought affecting the crop, which may have less effect on the crop receiving the higher K application.

On the sandy textured Apomu soil, where significant K response was observed already in the fourth cropping year, the main yield response was observed to be consistently higher at 40 kg K/ha than 80 kg K/ha. Though no definite explanation can be given for this observation, it may in part be due to the higher acidity build up with the higher K rate, which could have an indirect negative effect on the maize crop.

Data on the soil K-status with K application and cropping showed significant changes on both soil types (Fig. 21). The soil K-status showed faster depletion with continuous cropping compared to a bare uncultivated treatment, particularly on the Egbeda soil. Annual application of 80 kg K/ha was able to maintain the soil K-status of the Egbeda soil at a level comparable to that observed under bush fallow. However, on the Apomu soil, the K-status was observed to be lower than that observed under bush fallow even with an annual application of 80 kg K/ha.

The effect of maize crop residue retention and removal with and without fertilizer application in this long-term trial, which initially did not show any particular trend on the maize grain yield in the last few years began to result in definite effects (Fig. 22). On the Egbeda soil, removal of the maize residue, particularly without fertilizer application, significantly reduced maize grain yield. On the Apomu soil, removal of maize residue significantly reduced maize grain yield, particularly with fertilizer application.

The detrimental effect of continuous removal of maize crop residue with continuous fertilizing and cropping was observed to be more pronounced with the cowpea crop. In 1980, the cowpea variety used in the experiment was changed from VITA-4 to VITA-5. VITA-5 gave a lower yield (Fig. 23) and is apparently more sensitive to Mn toxicity. With continuous application of NPK fertilizers, there was a significant soil pH depression with both the Egbeda and Apomu soils. The lower pH resulted in higher mobilization and extractable Mn levels, particularly on the Apomu soil, resulting in lower cowpea yields mainly due to Mn toxicity combined with K deficiency.

**Plant residue management**

Despite the importance of maintaining adequate soil organic matter under the traditional techniques of shifting cultivation or bush-fallowing, the plant residue during seedbed preparation is commonly burnt off. The long-term effect of this practice compared to plant residue management has not been adequately studied. A trial was, therefore, initiated on an Alfisol at Ikenne, Nigeria, to study the effects of burning and mulching of plant residue in relation to fertilizer application on the performance of maize. Results of the trials during 1978-80 are shown in Table 34. Though some responses to N and P were observed following land clearing from fallow, significant responses to P and N were only observed, respectively, in the second and third years following clearing. The main response was to P application.

Though the mean maize grain yields do not show any significant differences between burning and mulching of the plant residue during the 3 cropping years, some effects were observed among the various fertilizer treatments. Without fertilizer application, PK, NP and NPK treatments combined with mulching gave a higher maize yield, particularly in the third cropping year. However, with the NK treatment, burning gave a higher maize yield, which may be attributed to a quick release of P from burning of the plant residue.

**Nitrogen-tillage interaction on maize**

Despite the importance of no-tillage systems in soil conservation, little information is available on the best nutrient management aspects of the no-tillage system of