GRAIN SORGHUM IN THE MOROBE AND CENTRAL PROVINCES

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INTRODUCTION

The 1977 season was one of mixed success for grain sorghum growers with the average yield of 2.5 t/ha being maintained in only a few areas. Problems with anthracnose (stalk rot) and *Heliothis* were made worse by a lot of rain at the end of the season. This meant that there was less sunlight and so poor grain filling. In some variety trials, new hybrids which were resistant to anthracnose gave higher yields than the susceptible standard variety Pioneer 846.

The use of varieties resistant to anthracnose together with more attention to insect control should ensure better yields in future.

In this article we will discuss the new recommended hybrids, aspects of insect control and general recommendations for the crop.

RECOMMENDED HYBRIDS

The following hybrids (with days to flowering in brackets) are recommended; Monsoon (60), Pioneer 846 (56), Dorado (54), Goldfinger (53) and Yates 266 (52).

With expansion in production, Pioneer 846 (P846) has become more susceptible to stalk rot and leaf diseases and can now only be recommended in new sorghum areas. Fortunately all the other recommended hybrids have shown good levels of resistance to anthracnose. They also have the desirable open head characteristic and have larger grains than P846. Dorado, Goldfinger and Yates 266 will maintain good yields under poorer conditions than P846 while Monsoon appears better suited to the longer growing seasons in the upper Ramu Valley.

Rather than sowing the same hybrid each year, if different ones are sown in the order listed above, it may help to make the flowering period shorter and help in midge control.

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SOWING

A sowing rate of 6-10 kg/ha is recommended to give a plant population of 180 000 plants/ha. The lower sowing rate should give this population on light textured soils with good moisture (e.g. Gusap soils) but the higher rate may be necessary on heavier textured soils especially if moisture is low (e.g. Marambung soils).

The recommended sowing dates for some grain sorghum areas are listed below.

Erap - Leron	-	January
	-	July to August but only on deeper soils and when not too dry
Leron - Mutsing - Umi	-	mid-January to mid-February
Umi - Gusap - Dumpu	-	mid-February to mid-March
Central Province	-	mid-January to mid-March

Waterlogged soils or light gravelly soils must not be sown to grain sorghum.

Part of a 500 hectare grain sorghum field at Leron, 1978

FERTILIZER

On new ground use ammonium sulphate to provide sulphur. On a short fallow, up to 100 kg/ha of nitrogen is required (10 bags/ha of ammonium sulphate). With a long fallow and in a normal crop rotation, 25 to 50 kg/ha of nitrogen should be sufficient. Soil analysis can be used to find out if there is enough phosphorous. Soil with less than 10 ppm should have 10 kg/ha of phosphorous applied to it (2.5 bags/ha single superphosphate or 1.25 bags/ha triple superphosphate).

Incorrect fertilizer application will result in slow crop growth and development, and poor yields.

Grain sorghum fertiliser trial at Leron showing response to N, S + P. Left: fertilized plot Right: unfertilized plot

WEED CONTROL

Apply atrazine at 1-2 kg a.i./ha (1.25-2.5 kg/ha of 80% product), preferably before the crop emerges. The lower rate will control broad-leaved species and the higher rate will control grasses. Spraying after the crop emerges will control broad-leaved species but is less effective on grasses.

Recent trials on screening new herbicides for *Rottboellia* control in sorghum at Marambung have not been successful. However control in maize, soybeans and peanuts appears to be possible.

INSECT PEST CONTROL

There are many insects associated with sorghum, but only a few of these are major pests. These include sorghum midge *Contarinia sorghicola*, *Heliothis armigera* and sorghum head caterpillar *Mampava bipunctella*. Armyworms and locusts *Locusta migratoria* occasionally cause losses.

Sorghum midge is a very serious pest of grain sorghum in Papua New Guinea. Injury is caused by larvae feeding on the developing grain. The life-cycle takes an average of only 14 days to complete and each female lays 30-100 eggs at flowering time. Numbers can therefore build up rapidly in an uneven crop and so cultural techniques to give even crop growth are recommended. It is also important to reduce the number of adults coming into the crop from wild plants around the field.

Rottboellia *smothering a grain sorghum crop at Maralumi*

The following practices are recommended:-

1. burn or plough stubble after harvest
2. use recommended crop agronomic practices to ensure that the crop flowers over as short a period as possible
3. slash wild sorghum plants around the edge of the sorghum block before flowering

The presence of at least 3-4 adults per flower head indicates that chemical control is necessary and use of DDT at 0.5-1.0 kg a.i./ha is recommended. The crop margins which are attacked first should be inspected regularly and sprayed as necessary.

Heliothis armigera attacks sorghum at all stages of growth but it is mostly a pest of the developing grain. Larvae wholly or partly eat the grains and thus allow moulds to build up later. The mature larvae measure up to 4 cm in length and have a variable colour pattern of green, brown, yellow and black markings.

Control of this pest has become difficult particularly in some areas where DDT has been reported to have no effect. Light trapping to monitor movements and population level of the adult moths is being looked into as a possible warning system. In the event of an outbreak, spraying with endosulfan at the rate of about 750 g a.i./ha will give the best chance of control. Presence of 4 larvae per flower head indicates that spraying is necessary.

Sorghum head caterpillars attack grain and tie the spikelets together with webs as they wrap themselves up. Insecticide should be applied as soon as the pests are detected as once they begin feeding and webbing they are too mature or too difficult to get at for control. The recommended chemical control measure is the same as that described above for sorghum midge.

Flower head of sorghum

Spraying should only be used if there are no other available methods of control. Proper managerial practices can often lessen the need for spraying. For instance, midge can be controlled by proper practices. If chemicals are to be used, care in handling and mixing must be taken and the manufacturer's instructions must be followed.

Army worms attack sorghum crops especially during the early stages of growth. Mass outbreaks may occur from within the crop or may invade from outside, causing heavy loss of leaves. For control, application of carbaryl to the leaves at 0.7 kg a.i./ha is recommended.

Aerial spraying appears a quick and relatively inexpensive way of controlling many insect pests. However, substantial areas need to be available for spraying to reduce costs and in some cases, such as against *Heliothis* in cotton, the technique has not been particularly successful.

RATOON CROPPING

This should be tried in the Erap-Chivasing area but not west of Leron. Only choose crops with a big enough plant population. Slashing the crop stubble is essential. Comparisons between removing and not removing the stubble and the effects of fertilizing should be investigated.

YIELD AND RETURNS

Depending on variety and season, the crop should mature 95 to 115 days after sowing.

Average commercial yields of 2.0-2.5 t/ha can be expected, although up to 4 t/ha have been recorded in some instances. At a current price of K100/t and costs of production at K100-150/ha, net returns of K100-150/ha can be expected.

CONTACT D.P.I. BUBIA FOR FURTHER INFORMATION ON GRAIN SORGHUM GROWING.