

estimate that this requires experiments at 16 GeV per beam — not DESY's top energy, but enough to break the present budget if pursued for more than half 1981 running time. Given the cash, they say, they could have a result by May or June. It will be interesting to see if Professor Seorgel can get it.

**Robert Walgate**

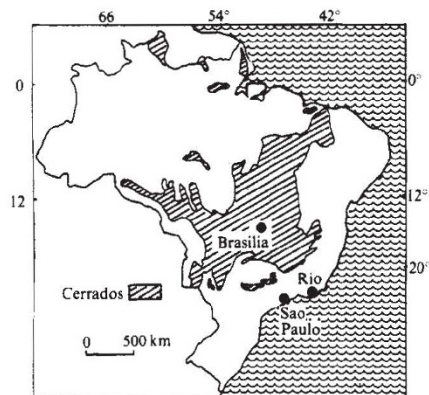
## Brazilian agriculture

### Soya beanfeast

Brasilia, November

In the scramble to develop its unexploited resources, officials say that Brazil is turning away from the Amazon Basin to an area of savannah, known locally as the Cerrados, covering about 180 million hectares mainly in the centre of the country. Attempts to open up the Cerrados, including the building of Brasilia, have so far produced only moderate results. But scientists have now convinced the government that the region offers great potential for agriculture.

The problem with savannah regions is that the very old soils have been leached of plant nutrients so only rough scrub supporting inefficient cattle grazing will grow. Aluminium concentrations in the Cerrados are also up to three times more than will be tolerated by most crops. Yet the soil structure and climate are good.



The problems of cultivation in the area are largely the responsibility of a government research institute, in the middle of the region, about 20 miles outside Brasilia. According to Dr Elmar Wagner, its scientific director, the aluminium and acidity problem can be solved by adding limestone, in quantities of roughly 2 tonnes per hectare depending on the crop to be grown. Fertility can be finally restored by adding approximately 150–180 kg of phosphate per hectare, and then maintained by the addition of nitrogen, phosphate, potassium, a trace of zinc and good soil and crop management.

Although Dr Wagner claims that agriculture can be maintained with less fertilizer than is commonly used in industrialized countries, fertilizing such a vast area would be a costly undertaking for Brazil, which has to import most of the raw materials for its fertilizer. So the search is

on for suitable nitrogen fixing crops.

Brazil has already experienced considerable success in breeding soya beans, now its main export crop, which fix all their nitrogen requirement. But attempts in 1979 to introduce nitrogen-fixing soya beans into the Cerrados from the southern coastal states were unsuccessful. Now a team at the Rural University of Rio de Janeiro claims to have discovered why.

According to Joanna Dobereiner, leader of the team, the sudden cultivation of newly-reclaimed tropical soils seems to increase *Streptomyces* fungi which produce antibiotics that kill off nitrogen fixing *Rhizobium* bacteria on the plants' roots. By isolating those strains of *Rhizobium* which survive and inoculating them into soya bean roots, she obtained good soya bean yields in a recent field trial in the Cerrados. She claims that by careful rotation of crops and by use of streptomycin-resistant *Rhizobium*, it may be possible to eliminate most of the need for artificial nitrogen fertilizer which accounts for 70 to 80 per cent of all fertilizer investment.

Most of the growth in farming in the Cerrados since 1975 has been in rough pasture for cattle raising. But Dr Wagner thinks that greater efficiency could be achieved by concentrating on grain crops and forestry. By cultivating most of the area available with improved methods he estimates that the total annual yield of grain crops could rise from 7.5 million tonnes now to 125 million tonnes and that of forestry from 15 million tonnes to 600 million tonnes. Meat production, he says, could be increased from 2.2 million tonnes annually now to 8.0 million tonnes even with pasture area reduced from 144 million to 80 million hectares.

With ambitious plans to cut oil imports further by using alcohol substitutes for petrol and vegetable oil substitutes for diesel, Brazil's need to open up more land to cultivation is becoming crucial. The problem was highlighted this year when Brazil was forced to import black beans from Mexico because some black bean land in the south had been turned over to alcohol production. The question now is whether the Cerrados could be used to grow food, leaving the traditional agricultural lands of the south free for sugar cane for alcohol, or whether the Cerrados itself could be turned over to sugar cane production.

Whatever the decision, the government will be faced with the problem of encouraging the growth of the Cerrados. It has been criticized in the past for encouraging the exploitation of land by wealthy southerners who seek quick profits and who have little interest in long-term development. A major challenge now will be transferring the results of research to the farmer and helping Brazil's underprivileged farming community in the north-east region to take part in the developments.

**Judy Redfearn**

## Schmitt stars again

Washington

Eight years ago he was collecting rock samples on the Moon. This summer he was a key fund-raiser for presidential candidate Ronald Reagan. And next year he will be the central figure for science in the US Senate, with responsibilities ranging from the programme of the National Aeronautics and Space Administration (NASA) to the budget of the National Institutes of Health (NIH).

A graduate from the California Institute of Technology with a PhD in geology from Harvard, Harrison (Jack) Schmitt won a surprise election victory as Senator for New Mexico in 1976.



Astronaut (right) and Senator (left) Schmitt

Last week he was appointed to head the Senate Commerce Committee's subcommittee on science technology and space. The committee is responsible for overseeing the programmes of both NASA and — if Senator Schmitt has his way — the National Science Foundation.

Not surprisingly, Senator Schmitt has been a keen supporter of the space research programme. With Senator Adlai Stevenson, the subcommittee's present chairman, he has been strongly critical of the Carter Administration's "unimaginative" approach to space policy — and his appointment has been welcomed in the space science community.

More controversial is his selection as chairman of the Senate's labour, health and human services subcommittee — responsible, among other things, for the biomedical research budget of NIH. This post was expected to go to Senator Charles Mathias, a liberal Republican and an enthusiast for biomedical research. But Senator Mathias has now shifted his attention to the Judiciary Committee, where he will counterbalance that committee's new chairman, conservative Senator Storm Thurmond.

Senator Schmitt's attitude towards this area of research is little known. Although a member of the present subcommittee, he has played little part in its deliberations on the NIH budget. As a geologist, he is expected to favour support for basic science; as an astronaut, NIH officials fear he may be drawn towards the high technology aspects of medical care, rather than its social and environmental dimensions.

**David Dickson**