

US agricultural research criticized

White House demands more project grants

Washington

A shake-up in the pattern of agricultural research in the United States may yet materialize. A group of agricultural experts assembled by the White House has urged a substantial expansion of competitive agricultural research grants, now consuming only \$16 million out of the \$1,500 million spent by the US Department of Agriculture (USDA) on research each year. The group says that under the present system, agricultural research is not always of the highest quality or focused on the most critical problems.

Although not new, the group's recommendation may carry more weight than earlier pleas on behalf of USDA's fragile competitive grants programme, for it included representatives of those who have most opposed the programme — the land-grant colleges and the state agricultural experiment stations. Traditionally these have seen competitive funding as a threat to their "formula funds", doled out on a state-by-state scheme dating back to 1887.

Dennis Prager, the assistant director of the White House Office of Science and Technology Policy who organized the group, says that "the agriculture research community has not kept pace with the cutting-edge of basic science". Institutions



such as Harvard and Stanford Universities, which are not in the land-grant college system, find it almost impossible to obtain research support from USDA. The establishment of the department's competitive grants programme in 1978 changed that picture only slightly. One consequence, according to Prager, is that "the really exciting basic biological science is going on outside the agricultural system".

Lawrence Bogorad of Harvard University, a plant biologist, argues that while there is expertise within the USDA system, those outside who could contribute something to agriculture are put off by the

difficulty of obtaining funding: "If you're in something that's really medically related, you can get reasonably funded with one or two grants. The problem with the plant business is that you get a little here and a little there. You spend more time writing applications." Or, you go into another field: "It's a good time now for young people trained in molecular biology to go into the plant sciences. But their question is invariably, will I get money to do this?"

Ralph Hardy, director of life sciences at Dupont and a participant in the White House study, points to plant growth regulators as an example of past underinvestment in the plant sciences. Dupont is interested in increasing yields by reducing the wasteful oxygen reaction in plant photorespiratory systems (so increasing the plant's utilization of carbon dioxide, and

thus increasing photosynthesis); but, says Hardy, "the problem is that our base of information has not been adequate" to develop a growth regulator that would accomplish this.

A perennial obstacle to would-be reformers of the agricultural research system is the sensitivities of those within. Despite the pains that the study took to underline the importance of retaining the present formula-funding for the land-grant colleges and state experiment stations. Prager has reportedly been the object of an intense campaign to have him fired.

The recent appointment of Orville Bentley, dean of the agricultural school at the University of Illinois, as the new assistant secretary for science and education at USDA is considered a good sign by those advocating change. Terry Kinney, director of USDA's Agricultural

Clinch River saved temporarily

Washington

The fates of two important technical projects, the Landsat satellite system and the Clinch River fast reactor, will now be decided by the lame-duck session of Congress that assembles after the elections on 2 November. That is the effect of the stop-gap spending bill passed hurriedly last week by Congress so as to avoid bringing government business to a halt on 1 October, the beginning of the new financial year. The stop-gap measure, known as a continuing resolution, will allow the Administration to keep on spending at the present rate only until 15 December.

Opponents of the reactor will try again when Congress returns after the elections to deal with the unfinished appropriations bills. They point out that in last week's Senate vote, three senators were absent who are all on record as opposing Clinch River. That would give the opponents a two-vote margin. And in the House, opponents believe that the only thing that stopped them this time was a rule forbidding floor amendments to continuing bills; an amendment to delete funding for Clinch River is thus almost certain to come up in the lame-duck session.

Meanwhile, the Department of Energy (DoE) began site preparation for the reactor after an injunction was lifted by the Federal Court of Appeals in Atlanta. This had been granted by a lower court to environmental groups, which had charged DoE with failing to obtain the proper water permits before beginning construction. DoE appears anxious to make as much progress as possible with the project before another vote comes up in Congress.

The lame-duck Congress will also have the task of straightening out funding for Landsat, which nearly became the victim of budgetary shuffling in last week's con-

tinuing resolution. Operation of Landsat D (launched on 16 July of this year) is due to transfer from the National Aeronautics and Space Administration (NASA) to the National Oceanic and Atmospheric Administration (NOAA) in January 1983. But by late September, Congress had not passed any authorization for the transfer, and the House Appropriations Committee accordingly deleted the \$15 million requested for NOAA's operation of Landsat from the appropriations bill for the 1983 fiscal year.

The House version of the continuing resolution followed suit, holding NOAA's spending for Landsat at the 1982 rate of only \$1.4 million per year. NOAA officials were alarmed; if the new money was not authorized by 15 October, they would not be able to award a contract for operation and maintenance in time to allow for a smooth transition and training of new personnel. The Senate, however, included the higher figure in their version and, luckily for Landsat, prevailed when the two versions were reconciled.

Just before Congress adjourned, a House-Senate conference committee cleared the way for a permanent resolution of the muddle by agreeing on language for a NASA authorization bill which includes the transfer of operating authority over Landsat to NOAA.

The conference committee also agreed to defer a decision on whether to transfer Landsat ultimately to the private sector, a goal of the Reagan Administration. The bill orders the Department of Commerce (of which NOAA is a part) to study alternatives such as a phased transfer; the creation of a corporation along the lines of COMSAT, which operates communications satellites; and keeping the present arrangement.

Stephen Budiansky

Research Service and a member of the study group, says that the competitive grants programme will also be helped by the appointment of a full-time director who will report directly to Bentley. (This plan has provoked concern that the job was going to a career bureaucrat; Kinney says that a career employee will serve on an "interim basis" only until an outside and well-qualified director is chosen.) Directors of the competitive grants programme have previously been on part-time leave from their universities; Kinney says

"one of the reasons that competitive grants have not expanded is that there hasn't been a full-time leader" in a position to lobby for it.

Another participant in the White House study, Lowell Lewis, director of the University of California's agricultural experiment stations, states another reason why the time may be ripe for a boost in competitive funding is the mood of Congress and the Administration. "I think we've heard the message clearly that we're not going to get across-the-board increases

in formula funds", he says; a more focused programme — such as competitive grants for basic research — is much more likely to be viewed with favour. Even allowing for the importance of formula funds to those in the land-grant system (and Lewis, like many others, vehemently defends the formula funds as essential to the research that every state needs to conduct on local agricultural problems), these budgetary facts may help to soften resistance to an expanded competitive programme.

Stephen Budiansky

Plutonium reprocessing

Fast breeder development

Spent fast breeder fuel — a mixture of plutonium and uranium oxides and a variety of active fission products — has been reprocessed into new fuel elements at Dounreay, Scotland, with 99.6 per cent efficiency, the United Kingdom Atomic Energy Authority announced last week. The efficiency (the ratio of plutonium leaving fuel fabrication to the plutonium introduced to the reprocessing plant) is crucial to the operation of a fast breeder fuel cycle and — until the Dounreay result — it had been expected to be only 96 per cent at best. Thus Dounreay has reduced potential plutonium fuel cycle losses from an expected 4 per cent to 0.4 per cent.

The figure is not only important for fast breeders in general — it might also be expected to increase Britain's chances of arranging international collaboration (and cost sharing) in the next stage of fast breeder development. France, for example, is leading the world in the construction of the first commercial scale (1,200 MWe) breeder, Superphénix (which should go critical in mid-1984 and feed power to the grid by the end of that year). But France is at least three years behind the United Kingdom in fast fuel reprocessing technology.

Could Britain use its reprocessing success as a bargaining card? Sources at the Commissariat à l'Énergie Atomique (CEA) think not. According to CEA, 90 per cent of the Superphénix core already comes through reprocessing the fuel of Phénix, its 250 MWe predecessor. But this has been achieved through a patchwork of inefficient processes both at La Hague (the commercial reprocessing centre near Cherbourg) and at Marcoule, a CEA research and production centre on the Rhône.

The largest French fast fuel reprocessing plant — at Marcoule — can handle two tonnes of spent fuel a year, only a quarter of the amount that can be handled at Dounreay. Moreover, efficiency at Marcoule is certainly lower than at Dounreay, although CEA sources express themselves "satisfied", allowing for the fact that the plant is old.

Marcoule is being upgraded, and will be able to handle 5–6 tonnes of fast fuel a year by 1984. But this in turn is only one quarter

of the expected reprocessing needs of Superphénix. Excess spent Superphénix fuel is to be stored in cooling ponds, awaiting the construction of a full scale commercial fast fuel reprocessing plant. To be economic, according to CEA plans, this plant would have to handle the output of up to eight breeders of the size of Superphénix, and have a throughput of up to 170 tonnes a year — a more than twentyfold scale-up of even the Dounreay plant. But, so far, French chemical reprocessing technology has been poor — La Hague, for example, has been working well below design capacity because of clogging and other problems.

French sources say, however, that the La Hague hold-ups have been "good experience", and that new plants — such as the upgraded Marcoule — will function well. A light water fuel reprocessing plant built by the French at Tokaimura in Japan is said to be operating efficiently.

Thus the French do not see the Dounreay success as an entry ticket to French reactor technology — particularly as Phénix appears, on the face of it, to have been such a success in comparison with the Dounreay prototype fast reactor (PFR). The two reactors are of the same scale (250 MWe) and vintage (1973). In recent years, PFR has shown a load factor, or proportion of electrical power output to the maximum theoretically possible, of only 20 per cent (in fact just 14 per cent in 1981–82). (By comparison, the world average for pressurized water (thermal) power reactors is about 60 per cent.) But Phénix has recently shown a load factor of around 70–80 per cent.

According to officials at Dounreay, the difference is that the Phénix stainless steel sodium-water heat exchangers, which are subject to leaks, are *modular* and can be changed quickly. But the cost of such changes would be uneconomic for a commercial reactor. PFR does not have modular exchangers, and so is out of action longer when a leak occurs. Superphénix, however, as a prototype commercial reactor, does not have modular exchangers, and this is leading to some fluttering hearts in France, say Dounreay scientists.

Robert Walgate

Blow for EISCAT

The European Incoherent Scatter Facility (EISCAT), opened with much fanfare in August 1981 to probe the Arctic ionosphere, is off the air: a valve has blown. But this valve, a klystron, is 4 metres long and costs \$200,000.

Luckily, the EISCAT planners had a spare, now being put in place. According to EISCAT director Dr Murray Baron, speaking from Tromsø, Norway, the cause of the original valve failure will not be known until it has been disassembled by its manufacturers, Varian Associates of California. He does not blame design error, although such problems led to a three-year delay in the start-up of the facility.

Varian had guaranteed the klystron for 1,000 hours of operation or a year of service; this valve had operated for 3,000 hours when it failed at the end of August, and Baron had expected another couple of thousand hours from it. Although the EISCAT committee has set aside a contingency fund to buy new or reconditioned klystrons every two or three years, this failure after just over a year would cause financial problems if it were repeated. Besides which if the spare valve were to fail, it would be seven to nine months before Varian could produce another, leaving EISCAT without transmitters and thus data. EISCAT has two transmitting systems, one in the UHF (933 MHz), whose klystron has failed, and one in the VHF (224 MHz) which is not yet delivered. The fear is that the fault may be in the equipment, not the valve, in which case the spare would also blow.

Otherwise, EISCAT seems to have been a success. Its three-week summer campaign this year involved rocket flights and television observations in parallel with EISCAT measurements and is said to have given interesting data on aurorae, sporadic E-layers and low-ionospheric spectra.

EISCAT is an international collaboration between West Germany, France, the United Kingdom (each contributing 25 per cent of capital and running costs), Sweden and Norway (10 per cent) and Finland (5 per cent). The original capital cost was £13 million.

Robert Walgate