Why have Green Revolutions so often failed to help peasant-farmers?

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This paper emerges from a book I am writing entitled 'Europe's Green Revolution: the Rise and Fall of Peasant-Friendly Plant-Breeding, 1890-1945'. For the most part it concentrates upon the emergence in Central Europe during the 1890s of a movement which aimed to bring the advantages of modern plant-breeding to smallholders, the work of the state plant-breeding stations which were founded as a result, and the decline of the German stations under National Socialism. Unlike so many of the Green Revolution (GR) programmes since the 1940s, however, these stations were quite successful in developing improved plant-varieties which were eagerly adopted by small farmers. The question is 'why'. One of the concluding chapters, therefore, compares the stations' work with that of the GRs of the 1940s to '60s in order to draw inferences about why programmes have failed or succeeded. And the other uses this European perspective to examine present-day claims that a 'second wave' of GR programmes just getting underway will finally succeed in alleviating rural poverty.

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How best to foster agricultural development in the 'Third World' has long been a subject of debate. In the case of the foundation-sponsored GR programmes after the Second World War, for example, critical voices began to mount from the late 1960s.

Although cereal yields and production had increased substantially, rural poverty and malnutrition persisted on a large scale. The explanation commonly given for this outcome was that the Revolution's plant-varieties and cultivation techniques were more suitable for large commercial farmers than for almost all peasant-farmers. Critics called accordingly for the development of more appropriate forms of technology which were better adapted to Third World conditions. The question I want to address here is: Why has it proved so difficult to devise technology appropriate for small farmers?

Several explanations which are occasionally offered for this failure can be ruled out right away. For one thing, the failures of the GR probably have little or nothing to do with limitations of the agricultural sciences since commentators are agreed that *most* development projects, of whatever kind, have also failed.[1] Second, it is sometimes suggested that the GR promoted a particular package of cultivation technologies because there was no *alternative*: no methods were available which could have assisted small farmers working in relatively unfavourable growing conditions. This explanation is plainly wrong since there are numerous counter-examples. Some of these have been known for nearly a century (as we will see in section 4 below), but others have emerged from recent experience.[2] A third explanation sometimes proferred is that the GR's planners and scientists were keen to increase production overall but never really committed to alleviating hunger among the poor. This is at best a partial truth. To be sure the evidence does suggest that *some* participants in the GR have not regarded the amelioration of poverty as the principle aim of such schemes. During the 1950s and '60s,

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[1] eg, Ferguson, *Anti-Politics*; Cooper & Packard, 'Intro'; Millikan & Hapgood, iv; Scott, *Seeing Like a State*.

[2] Though it is often assumed that the marginal lands so often farmed by smallholders have no potential for food-production, technologies have been devised which increase the productivity of such lands by as much as three or four-fold so that marketable surpluses can be produced (Conway & Barbier, *After the GR*, 92-93, 135-136).

for example, some development economists tended to regard GR programmes as little more than engines of 'modernisation' which would serve to integrate developing countries into international markets, and more than a few American politicians - along with sectors of agribusiness - saw such programmes as opening up attractive markets for western technology.[3] But if we focus on the aims of the *scientists and planners* involved in the GR, evidence from some of the most important programmes suggests that experts were genuinely concerned with alleviating hunger.[4]

What *was* important if a programme was to reach smallholders, however, was that it had to provide more than just appropriate technology. The political and economic background conditions within which a programme had to operate were crucial. There is by now widespread agreement, for example, that the governments of host countries need to provide investment in certain kinds of infrastructure - eg, for irrigation, transport, agricultural research and especially extension - if the technology is to make the desired impact. Equally important is that agricultural policies must be designed so as to support peasant farming; this means, for example, good credit facilities as well as subsidies to reduce the costs of fertiliser and other inputs.[5]

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[3] Eg, Rostow saw third world agriculture as an important potential market for western technology (Flora and Flora, 'Historical perspective', 22-23; Millikan and Rostow article reprinted in Simpson, *Universities and Empire*). Similarly, USAID's economic assistance to Egypt effectively subsidised a wide range of U.S. corporations (Mitchell, *Rule of Experts*, 236-240). On politicians, see Anderson, 'Origins of IRRI', 61-62; Johnston, 'Japanese model', 78-79. On agribusiness, see Gaud's 1968 talk, 7; Unger, 'Industrialisation vs agrarian reform'; Cleaver, 'Contradictions', 89-90; Johnston, 'Design', 262.

[4] On IRRI see Anderson et al, *Rice Science*, chp 2; on the Mexican Agricultural Program see Harwood, 'Peasant-friendly plant-breeding and the early years of the Green Revolution in Mexico', *Agricultural History*, vol 83 (2009), 384-410.'

[5] Griffin, *Alternative Strategies*, chp 6. By the 1980s even defenders of the GR package of technologies

These background conditions, however, have often been discussed and need not concern us further here. What I want instead to focus upon is an ostensibly narrower issue which has received rather less attention in the literature: the ways in which programmes were conceived, organised and implemented. To do so I have drawn upon the writings of development experts from the 1970s to the '90s, in which they reflect upon the strengths and weaknesses of the previous generation of GRs; the aim is to tease out those features which they believed were most important in helping a programme to reach peasant-farmers. What one finds is a considerable degree of consensus. Experts repeatedly draw attention to the importance of two features - how programmes are organised and attitudes among experts - and occasionally to a third: whether planners have given any thought to a programme's political ramifications. After discussing each of these in turn, I note that nearly all of these 'hallmarks of success' were already embodied in various older development programmes. In the conclusion I ask why the planners of the post-1945 programmes appear to have learned so little from earlier experience.

1. How were programmes organised?

Several aspects of a programme's organisation were thought to be significant. One is that they should be decentralised. Ambitious development programmes, as James C. Scott has so vividly demonstrated, have typically attempted to to impose a uniform and centrally administered scheme upon highly diverse circumstances, generally with disastrous results. The GR was a case in point. Because both the ecological and economic

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were agreed on the importance of these conditions: eg, Pinstrup-Andersen and Hazell, 'Impact of the GR'; Hayami/Ruttan 1985. On the other hand, setting exchange rates at a high level (or reducing tariffs) so as to reduce the cost of importing agricultural machines, tends to favour large farmers rather than smallholders since the former are much better placed to exploit machinery (Johnston, 'Governmental strategies', 164).

conditions of farms in many areas of the developing world are very diverse, research and development activity needs to be accordingly decentralised.[6] It is quite unlikely, for example, that any single plant-variety, bred at some central experiment station, will do well everywhere. This was one of the weaknesses of the early work at the International Rice Research Institute where 'The planners of the IRRI were interested in … universal, not local, solutions'.[7] More generally, Chambers has argued that decentralisation of decision-making is essential in order that scientists can respond flexibly to the diversity of local conditions. And conversely, one of the reasons cited for the success of Japanese and American public-sector agricultural research since the late 19th century is that these systems were decentralised.[8]

Organising the research effort properly, however, is not enough; its intended beneficiaries also need to be organised. With large commercial farmers this is not generally a problem since they tend to be relatively well-organised (and thus able to

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[6] Scott, *Seeing Like a State*, esp. chp 8. On the diversity of climate and soils over short distances in tropical regions, for example, see Johnson and Ruttan, 'Why are so few?', 700.

[7] Anderson, Origins of IRRI', 85; cf Anderson et al, Rice Science. IRRI claimed that its first 'miracle' variety was 'a rugged variety which could go almost anywhere'; in the event, it couldn't (cited in Cullather, 'Miracles', 244). The same centralising tendency also impaired work at the Bangladeshi Rice Research Institute through the 1970s (Anderson, 'Removing the Limitations'). In West Africa after ten years of varietal-testing in which some 2000 imported rice varieties were tried in the mangrove swamps, only two were found which performed as well as local varieties (Spencer, 'Agricultural research', 225.

[8] Chambers, 'Reversals', 186-187; cf. Pearse, Seeds of Plenty, 234. On Japan and the US see Hayami & Ruttan, *Agricultural Development*, 423-424.

cream off the benefits of new technology quite readily).[9] The issue is crucial, however, for peasant-farmers who are rarely organised and thus less able to voice their needs and lobby for resources. Moreover an organised peasantry also makes the tasks of extension much easier.[10] Thus organising peasants into cooperatives, for example, has often been cited as a key to the success of development programmes, not only in the Third World since 1945 but also at an earlier period in Europe and Japan.[11]

Even when programmes are well-designed in these respects, however, they still require sponsors who manage them sensibly and can take the long view. The pressure for quick results, often driven by the donor's short-term concern with public relations, is generally damaging. As Chambers puts it,

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[9] This was noticeable, for example, in India during the 1970s (Anderson et al, *Science, Politics*, part 1; see also Hayami & Ruttan, *Ag Development*, 362; and Pearse, *Seeds of Plenty*, 'summary').

[10] Flora and Flora, 'Historical perspective', 15-16; Chambers *Rural Development*, 214-215; Johnston, 'Design', 262-263. Chambers sees such organisational work as one of the areas where NGOs can make an impact (Chambers, 'Reversals', 192). Ruttan makes the case for farmer-organisation on the grounds that the ministries responsible for agricultural research in developing countries cannot be relied upon to provide stable long-term funding; this will only be secured if there are organised farmers' groups able to press their interests effectively (Ruttan, 'Reforming', 411).

[11] On the Comilla Project in Bangladesh and the Puebla Project in Mexico see Dahlberg, *Beyond GR*, 194-198; on Denmark, India, and Japan see Hayami & Ruttan, *Ag Development*, 427-438; on South Korea, Japan, Taiwan & China see Griffin, *Alternative Strategies*, chp 6; see also Millikan & Hapgood, *No Easy Harvest*, 127, 130. In the Philippines and Taiwan organisations of small rice-farmers who handle water-control and machinery collectively have been very successful in boosting production (Bray, *Rice Economies*, 192-193).

> There is a recurrent tendency to home in on a single, preferably technical and physical, objective [such as increased food production] …. Narrow professionalism here combines with practical imperatives, the need to do something and to be seen to have done it, regardless of who gains.[12]

And when speed is of the essence, experts naturally concentrate on tasks which are relatively straight-forward - such as varietal development - rather than more difficult and time-consuming activities such as extension though the latter is arguably more important for smallholders.[13] Moreover where programmes have nevertheless devoted some effort to the more difficult task of extension, they often still end up neglecting the needs of peasant-farmers since dealing with large farmers is so much easier.[14]

2. Attitudes among experts

Well-organised programmes with patient sponsors are important, but a great deal also hinges on the attitudes among the individuals who design programmes as well as those who deal with farmers day to day. Arrogance - eg, a boundless confidence in

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[12] Chambers, *Rural Development*, 35; see also Leonard, 'Putting the farmer', 208-209, and Johnston, 'Design', 265-266.

[13] On the Mexican GR see Harwood, 'Peasant-friendly plant-breeding'; on the pressures upon IRRI to produce an all-powerful rice variety, see Cullather, 'Miracles', 243; on a Cornell-project's avoidance of extension in China see Stross, *Stubborn Earth*, chp 6.

[14] Pearse, *Seeds of Plenty*, 16; Chambers, *Rural Devel*, 24. Given the costs of GRs, many governments have also preferred programmes to concentrate their efforts on particular regions where the impact is likely to be high. In India, for example, the GR went farthest in the Punjab and other northern wheat-growing areas where commercial farming was most advanced prior to the GR (Griffin, *Political Economy*, 207).

'science' and an inclination to dismiss local knowledge, whether from scientists or farmers - is not uncommon and has hampered more than a few programmes. At IRRI, for example, local Philippino scientists' warnings about trying to breed a single 'miracle variety', especially one which required both irrigation and synthetic fertiliser, were ignored though they eventually proved justified.[15] Conversely, the successes of several GR programmes in producing effective cultivation practices for smallholders have been attributed in part to experts' willingness to listen and observe, to consider the rationale for long-standing indigenous practices, and sometimes to draw upon both indigenous and 'scientific' methods in order to devise hybrid approaches.[16]

Arrogance is not always the problem; sometimes it looks as though experts were simply ignorant of the problems faced by small farmers (whether those in the host country or even in their own). It is tempting to think that this might have been a factor in the failure of many of the earlier programmes planned and staffed by American agricultural scientists because of the rarity of peasant agriculture in the U.S. (or perhaps it would be more accurate to say the *invisibility* of smallholders from the perspective of most land-grant universities). There are hints in the literature that this may have been the case,[17] but to my knowledge this has never been systematically investigated. Another

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[15] Anderson et al, *Rice Science,* 66; on IRRI's attempts to curb the work of two Indian rice research institutes whose work took a different though productive approach, see ibid, 92 and Juma, *Gene Hunters*, PP?. Arguably this kind of over-confidence is a weakness of all large and centrally administered development projects, agricultural or not (Scott, *Seeing like a State*).

[16] Dahlberg argues that this policy of 'walking on two legs' is part of the reason for the doubling of rural income in China between the early 1950s and late '60s (Dahlberg, *Beyond GR*, 207-209), and similar claims have been made for Sri Lanka and India (Anderson et al, *Science, Politics*, part 2). On the need for farmer-participation more generally, see Chambers, *Rural Development*, 98-100; Pearse, *Seeds of Plenty*, 234-236; Millikan & Hapgood, *No Easy Harvest*, 87.

[17] Anderson, 'Origins of IRRI'; Flora and Flora, 'Historical perspective', 16-17. Ruttan implies that the first

reason why American experts might have known little about the problems of peasant agriculture is that, unlike several European countries, the U.S. did not administer a colonial empire. To be sure, one should not idealise colonial agricultural services; they tended to focus on export crops rather than domestic food production, and there was no shortage of disasters caused by the introduction of inappropriate technology.[18] Nevertheless, scientists in many colonial empires at least became familiar with peasant agriculture, and as we shall see in section 4, some were even able to recognise the advantages of indigenous cultivation systems.

Ironically, the clearest evidence I have found of such ignorance is among agricultural scientists from the developing world. Unlike the U.S. where throughout most of the 20th century members of this group came from farm backgrounds and identified with farmers, in the Third World few peasants can send their children for higher education. As a result agricultural scientists tend to come from relatively well-off urban backgrounds and thus have no experience of either manual labour or agriculture, nor much sympathy with the needs of peasants.[19]

3. Taking politics into account

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generation of GR experts were ill-prepared for what they encountered in developing countries when he remarks that it became clear *only in the 1960s* that agricultural expertise based on experience in the temperate zone was not very useful in tropical zones (Ruttan, 'Int. Ag Research System', 174, 186).

[18] Eg, Richards, *Indigenous Agricultural Revolution*, 31-36; Henry, 'Technology transfer', 62-64; Hodge, *Triumph*, chp 7.

[19] Observers of the GRs in both Mexico and India have drawn attention to this issue (Cotter, *Troubled Harvest*; Gupta, 'Scientists views', 30), but it appears to be more widespread (Flora and Flora, 'Historical perspective', 14-15; cf Millikan & Hapgood, *No Easy Harvest*, 88).

Designing better programmes and changing the attitudes of experts imply that 'flawed' GR programmes can be fixed simply through more careful organisation and recruitment. While these two factors probably do help to explain why many programmes have failed to reach peasant-farmers, various commentators on the GR have drawn attention to a more fundamental weakness; namely, that many programmes fail to take into account the political implications of development. Robert Chambers, for example, has argued that during the 1970s it became evident that the most serious limitation of most development programmes was their failure to consider what was politically feasible. While there were well-established procedures for assessing technical and financial feasibility, political feasibility was not part of standard programme-appraisal, despite the fact that projects aimed at resource-poor farmers are typically captured by local elites.[20] Kenneth Dahlberg agreed:

> … those development aid programs that seek to improve the condition of the small peasant farmer must necessarily address the question of how existing administrative and political power patterns need to be changed if such programs are to have any chance of success. [That means they] need to become much more sophisticated regarding the real redistributive effects of various kinds of policies and technologies.[21]

This diagnosis finds support from a number of case studies. Commercial landlords, Andrew Pearse remarks, tend to block redistributive measures in aid of peasant-farmers and the landless because they want to preserve a cheap labour force. While government

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[20] Chambers, *Rural Development*, 160-163; see also Johnston, 'Design', 265.

[21] Dahlberg, *Beyond the GR*, 131 and 180; in a similar vein see Ladejinsky, 'Advancing human welfare', 206-208; Farmer, 'Perspectives on the GR', 192; Leonard, 'Putting the farmer', 209.

policies could discourage the growth of inequality when new technology is introduced (eg, by taxing the land or the income of large landlords), they seldom do so, Keith Griffin has argued, because it is not in the interests of the groups which control government.[22] Land-reform is a case in point. Although it would extend the benefits of the GR to more farmers and increase the efficiency of production - because small farms usually generate higher yields than do large ones - it is routinely resisted. The Indian government's development strategy during the 1950s, for example, emphasised land-reform but did not get very far due to strong resistance from rural elites.[23] By contrast, among the few places where GRs have been successful are countries where governments have been willing to curtail landlord-power (or have not needed to since land was already relatively equally distributed): Japan, China, South Korea, Taiwan.[24]

Why, then, this blindness to the political dimension? It might perhaps be attributed to naivete, reflecting the fact that the social sciences have played such a marginal role in most GR programmes. Various observers have remarked that the natural

[22] Pearse, *Seeds of Plenty*, 'summary'; Griffin, *Political Economy*, 217; cf. Johnston, 'Design', 262. That technology transfer from the U.S. to Peru has had only a limited impact has also been attributed to a failure to take into account the political dimension (Eastman & Grieshop, 'Technology development', 50-52). Landlord power, of course, did not begin in 1945. In colonial Kenya, for example, European planters - who primarily grew export crops - objected to local government attempts to develop research on domestic food production (Sabina Clarke, diss, chp 5).

[23] Griffin, *Polit Economy,* 220-229; Frankel, *India's GR*, 4, cf 205-206.

[24] Bray, *Rice Economies*, 190-192; Griffin, *Alternative Strategies*, chp 6 and 179-180; Hayami & Ruttan, *Ag Development*, 360; Johnston, 'The Japanese 'model'', 91; cf. Pearse, *Seeds of Plenty*, 240ff. In one region of South India the predominance of very small farms and almost total absence of large ones has been seen as important in maintaining a relatively equal distribution of gains from the GR. Small farmers there were unlikely to be bought out or evicted as land became more valuable, and there was little mechanisation which might have displaced labour (Hazell/Ramasamy, *GR Reconsidered*, 251.

scientists who have dominated such programmes tend to be overly optimistic about the prospects for change but only dimly aware of the economic, social or environmental implications of the GR. According to Farmer, this technocratic mentality is also not uncommon among the agricultural economists who were eventually added to GR programmes.[25] But the marginality of the social sciences is more likely to be symptom than cause. For it is quite clear that development sponsors have studiously avoided 'getting involved' in politics. In India, for example, the Rockefeller Foundation consistently sought to maintain an apolitical image, and in southeast Asia the Foundation was interested in those 'isolable technical problems' of rice-cultivation which would not require changes in the social relations of production. In Egypt the USAID declined to support proposals for land-reform, though it was an obvious barrier to economic development.[26] Significantly, it was not that staff on the ground failed to notice the political dimensions of their work but that programme administrators sought to steer clear of these. In Mexico, for example, the Rockefeller Foundation's head of agricultural research in 1959 rejected an application from staff to attend a conference on land-reform for fear that it could impair the Foundation's cooperation with the Mexican government. It was thought less controversial for the programme's economists to concentrate on marketing and production. And in Bangladesh rice scientists were often aware of the sociopolitical obstacles hindering the success of their work, but they thought little would be gained - and quite a lot might be lost - by publicising the fact since their research was funded and thus controlled by planners and the government.[27]

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[25] Chambers, paper in Bayliss-Smith and Wanmali; Pearse, *Seeds of Plenty*, 216-217; Farmer, 'Perspectives on GR', 185-186. Some have suggested that economists tend to ignore the political dimension because it greatly complicates their calculations (Dahlberg, *Beyond the GR*, 182).

[26] Goldsmith, 'RF and Indian Ag Program', 104; Anderson, 'Origins of IRRI'; Mitchell, *Rule of Experts*, 218-221; Cooper and Packard, 'intro', 26 .

[27] Jennings 1988, 164; Anderson et al, *Rice Science*, chp 10.

Is the avoidance of politics to be understood simply as a case of development agencies acting pragmatically, trying not to antagonise host governments so that as much as possible can be achieved? Over the last decade or two various authors have offered a broader framework within which the limitations of GR programmes can be understood. They argue that although 'development' is generally portrayed as a process which can be fostered solely via *technical* measures, the social changes comprising 'development', above all poverty-alleviation, are actually impossible without political intervention. To champion 'development', therefore, has entailed repressing the need for politics.[28] Such repression, as we have seen, has been most congenial to development agencies who do not wish to provoke host governments. Thus the whole point of the GR programmes, as one critic puts it, was to try to avoid the need for land-reform by concentrating on technical change.[29] On the other hand, however, it is precisely this apparently *apolitical* character which has also made such programmes politically *useful* to both donor and recipient countries. As is well-documented, during the 1950s a principle aim of western governments' GR programmes was to counter the possible spread of communism among Asian and Latin American peasants. And as Ferguson points out, some host governments have also found that development programmes can be appropriated for their own

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[28] Ferguson, *Anti-Politics Machine*; Cooper & Packard, 'Introduction'; Mitchell, *Rule of Experts*. This formulation might make it appear as though the organisational factors discussed in sections 1 and 2 are in some way incompatible with the essentially political character of development, and I can imagine that some protagonists in the debate over the nature of development may argue as though this were so. But it seems clear that the two are entirely compatible: organisational features *can* contribute to a programme's success, but only where the requisite political conditions are also favourable.

[29] Griffin, *Alternative Strategies*, chp 6.

undeclared political purposes.[30] Thus several of the interest-groups involved in such programmes gain from this useful fiction (though not the intended beneficiaries).

Reflection upon the strengths and weaknesses of the GR since the 1970s, as upon development programmes more generally, therefore, has yielded a good deal of insight, not just into effective forms of organisation but also into the centrality of politics to that process.[31] One of the obvious questions the foregoing discussion raises is whether those currently planning the *next* generation of GRs (eg, that underway in sub-Saharan Africa or the 'second GR' which proponents believe will be based on agricultural biotechnology) have given some thought to the successes and failures of previous GRs and will conceive the new programmes accordingly. I would be delighted if that were to prove the case, but if past experience is anything to go by, one cannot be optimistic. For if we go back two generations or so, those who planned the first wave of GRs in the 1950s and '60s seem to have learned astonishingly little from the history of previous development programmes.

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[30] See also Leonard, 'Putting the farmer in control', 197, 205-206.

[31] That commentators on the GR should have reached such radically different conclusions as to the causes of its failures makes one want to look more closely at those advocating these standpoints. I do not yet know the field of development studies well enough to do this, but it may be relevant that the authors whose work I have been discussing are a pretty diverse bunch. Some of the work is written by practitioners professionally engaged in development work who presumably have an interest in its continuation and who may, therefore, be inclined to focus less on programmes' political premises than upon their organisational flaws (eg, Hazell, Ruttan). Others, however, appear to be primarily academics who have some first-hand familiarity with development projects but who are interested in analysing the process as a phenomenon (eg, Ferguson, Mitchell). One wonders, therefore, whether those who have drawn attention to organisational factors tend to be practitioners while the political point is being raised by academics who are able to occupy a vantage point further removed from the development industry.

4. Peasant-friendly development before 1945

Consider three episodes from this history. A number of recent studies of development policy in the British, French and Dutch empires have drawn attention to the experience acquired there between the wars by colonial agricultural officers. As a result of the failure of numerous development schemes, quite a few of these officials reversed their original assumption that indigenous cultivation practices were 'backward' or irrational; some concluded that they were actually superior and called for more research on them.[32] Mechanisation and synthetic fertilisers central to intensive cultivation schemes, they concluded, were too expensive for most peasant farmers and often led to serious environmental damage (thus echoing identical criticisms of the GR from the 1970s). If they were to succeed, development schemes needed not only to take much more account of local variations in soil and climate but also to be based upon consultation and cooperation with peasant-farmers.[33] As Joseph Hodge points out, since

[32] This viewpoint bears a striking resemblance to 'farming systems research', an approach which emerged in the 1970s and '80s in response to criticism of the first wave of GRs and which urged experts to look more closely at the practices devised by small farmers in order to make a living in very particular ecological conditions.

[33] This emphasis upon consultation was to reemerge from the 1970s in the movement for 'participatory' plant-breeding. On colonial agriculture see Hodge, *Triumph of the Expert*; van Beusekom, 'Disjunctures'; Moon, REF; Tilley REF; Maat REF; for a first-hand account from British India, see Howard, *Agricultural Testament*. On colonial experts' respect for indigenous systems see Warren, 'Linking scientific', 162-163; Bonneuil, 'Penetrating the natives'; and Bonneuil, 'Development as experiment', 279-280. In British colonial Nigeria and Sierra Leone during the 1920s and '30s agricultural officers began to realise that local farmers had developed a variety of innovative cultivation practices which made both economic and

many of the agricultural experts employed by the World Bank, FAO and other development organisations had acquired substantial experience in the British colonies, it is odd that so little of this experience seems to have filtered through to post-war development agencies.

A second pre-war context from which lessons might have been learned was the remarkable agricultural development of Japan from about 1880 to 1930. Since Japanese farms were very small (2-5 acres), there was little point in investing large sums in machinery, but the introduction of intensive cultivation was nonetheless possible thanks to the availability of an extensive irrigation system, state subsidies for fertiliser-purchase, a well-developed extension service, and a network of local cooperatives with which extension agents could work. (Here one sees the importance of what I have called background conditions as well as of farmer-organisation, both of which had to be 'rediscovered' by green revolutionaries two generations later.) Initially impressed by foreign technology, the Japanese had introduced improved plant-varieties from the West, but when these varieties failed, public sector experiment stations, in close association with local farmers' organisations, adopted two approaches. In the 1880s and '90s they tested the rice varieties grown in different regions of Japan (some of which had been much improved by local farmers) in order to establish the best ones which were then diffused to other regions. From around 1900, however, breeders in the stations began to develop new varieties of rice and wheat from scratch. Significantly, this breeding process was organised in a decentralised manner[34] and by the 1920s had proved so successful that

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ecological sense (eg, inter-cropping, shifting cultivation, minimum tillage). Interestingly, however, this peasant-oriented approach was abandoned after 1945 because the colonial administration became enamoured with the kinds of high-input methods so characteristic of the GR (Richards, *Indigenous Ag Revolution*, chp 1). Systematic research on inter-cropping in sub-Saharan Africa, for example, did not resume until the 1970s (Spencer, 'Agricultural research', 224).

[34] Although the initial crosses and selection in the first few progeny-generations took place at the national experiment station, subsequent selections were carried out at the regional experiment stations, and the

Japanese dwarf wheat varieties were chosen by Rockefeller Foundation breeders during the 1940s as parent-lines in the Mexican Agricultural Program. Thus endowed with both favourable background conditions and appropriate technology, productivity grew rapidly from the 1880s, rural overpopulation was usefully absorbed, and the agricultural economy generated the capital necessary for industrialisation.[35]

Unsurprisingly this 'Japanese model' attracted interest in English-speaking development circles during the 1950s and '60s, and several economists called attention to its potential applicability to development elsewhere in Asia.[36] To judge from the by now widely-acknowledged mistakes of the early GRs, however, GR planners seem not to have paid much attention to the Japanese model, and over the last decade or two this episode

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resulting lines were then distributed to provincial stations for testing (Hayami et al, *A Century*, 145; see also 49-57 and 64-65).

[35] Francks, *Tech and Ag Devel*, 77-80, chp 5; Ushiyama, 'The establishment'.

[36] As early as 1951 Bruce Johnston was suggesting that Western planners would do better to draw upon Japan's experience than on their own: 'The Western world has only begun to develop an alternative formula [to that of the USSR] for fostering economic progress and raising levels of living in [Asian] countries; and experience in the West is in large part inapplicable to Asiatic conditions' (Johnson, 'Ag productivity', 498). See also Nicholls 1964; Johnston 1966; Hayami and Ruttan, *Ag Development*; on the GRs in Japan and elsewhere in East Asia, see Griffin, *Political Economy*, chp 3. Already in 1911 a division chief at the U.S. Department of Agriculture was urging American readers to take note of the very high yields which farmers in Japan and elsewhere in East Asia were getting, using neither mechanisation nor synthetic fertiliser. Their apparently crude and simple tools were cheap, efficient, and ideally suited to the conditions, he argued, and their cultivation methods made good use of the rural areas' abundant labour (King, *Farmers of Forty Centuries*). His emphasis upon the power of organic fertilisers, however, seems not to have reached a conference of development experts at MIT in 1964 who did not even bother to consider the possible contribution of organic fertilisation to increased productivity, believing that it could not secure large enough yield-increases (Millikan & Hapgood, *No Easy Harvest*, 29).

(as well as the agricultural history of other similar East Asian countries) seems to have largely disappeared from the literature on the GR. This is unfortunate since the case study reveals very clearly just how much can be achieved when the state is able and willing to intervene on a large scale: by organising farmers, investing in peasant-friendly public-sector facilities, and pushing through land-reform.[37]

Since I have studied the third pre-war episode in some detail - agricultural development in Central Europe ca. 1900 - we can look more closely at how it compared with recent GRs. In the space of about a decade plant-breeding was taken up in various kinds of public-sector institutions in regions of Central Europe where farms, as in Japan, were predominantly small, and in each case the breeding work was specifically addressed to the needs of small farmers. They were to be found in Switzerland (1898, 1907), Austria (1902), Alsace-Lorraine (1905) as well as in Germany at Saxony (1896) and especially in southern Germany at Bavaria (1902), Württemberg (1905) and Baden (1908). The rationale for these establishments was that since the regions in question lacked a commercial plant-breeding industry, commercial varieties had to be imported from elsewhere, and although firms marketed these varieties as high-yielding everywhere (*Universalsorten*), in fact they fared poorly in these regions (for the same ecological and economic reasons which undermined centralised breeding in the GR). The new

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[37] Could it be that the demonstrable efficacy of *political* action in Japan may have actually discouraged development planners from drawing upon the model? Some analysts have pointed toward the differences between Japanese conditions and those in current-day developing countries, among them higher rates of population-growth in the latter plus the high degree of irrigation in Japan by 1880 and its extensive agricultural research system, both of which latter may be too expensive for many third world governments today (eg, Francks, *Tech and Ag Development*, chp 9; Hayami et al. *A Century*, chp 8). Nevertheless it is worth noting that not all of Japan's policies entailed large costs - eg, the decision not to mechanise, developing improved plant-varieties from locally-adapted ones - and at least in the 1970s Hayami was optimistic that despite the differences, developing countries could still learn something from Japan's experience.

experiment stations, therefore, were to take responsibility for developing locally adapted varieties, but their strategy was significantly different from that in the original GR programmes. Rather than trying to adapt centrally bred (commercial) varieties to local conditions - as had the rice-breeders at IRRI during the 1960s - the stations chose to start with already well-adapted 'local varieties' and try to improve their yield.[38] This strategy was controversial at the time - critics dismissed it as 'regressive' - but by the 1920s it had proved very successful. In Germany, for example, around 10-20% of those cereal varieties reckoned to be the best in the country at that time had been bred at (or with the assistance of) the new stations. Moreover, they proved so popular with farmers in the respective regions that commercial breeders began to complain about 'unfair competition' from the public-sector. By the 1930s various observers were concluding that the private sector had effectively lost the south German seed-market.

In view of their evident success in serving small farmers, how did these stations measure up against the occasionally successful GR programmes discussed above? In terms of their organisation, an important feature of the south German stations' breeding work is that it was decentralised. In Bavaria, for example, while the preliminary stages of breeding were usually carried out at the main station in Weihenstephan, promising mixtures of lines would then be handed over to regional branches of the station where the main breeding process would be conducted. (By 1920 such branches had been set up in each of the eight main agro-ecological regions of the state.) This guaranteed that the finished variety would be well-adapted to the region in which it was to be grown. Another significant feature of the Bavarian station's work is that its staff did not simply carry out plant-breeding or other forms of research and development; they also devoted an

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[38] In one respect the south German breeding strategy was even better suited to conditions in the developing world than was the Japanese model. For the high-yielding and locally-adapted varieties bred in south German institutions, unlike those in Japan, were designed not to be 'fussy': ie, not to require synthetic fertiliser or careful soil preparation. As a result their use did not impose additional costs upon the small farmer.

enormous amount of time and effort to organising farmers in the state into growers' associations. The rationale for such organising was two-fold. On the one hand, it would be far easier for the station to promote improved varieties and cultivation techniques among farmers if the latter were organised. On the other, small farmers' economic position would be stronger if they were organised since they could not only buy seed, fertiliser and other inputs in bulk but also obtain better prices from millers and brewers by marketing their grain collectively. Finally, I have found no indications that the station was under pressure from the Ministry of Agriculture to get quick results. Indeed, organisational work of this kind was necessarily slow and labour-intensive and thus not something the station is likely to have indulged in, had it been under great pressure. In any event, the growers' associations proved extraordinarily popular with farmers, and the Ministry was evidently satisfied with the station's work since it increased appropriations steadily.

What about the attitudes among staff employed at the stations? This is not easy to judge since the requisite sources are few and far between. Nevertheless, indirect evidence suggests that staff were neither ignorant of peasant agriculture nor arrogant in their dealings with farmers. For one thing, several of the station-directors were themselves from peasant backgrounds while others were strongly committed to serving small farmers.[39] In addition, the time which Bavarian staff devoted to organising the region's

[39] At the Bavarian station, for example, although Carl Kraus was the son of a Bavarian primary school teacher (Kiessling, 'Geheimer Hofrat'), his successors, Ludwig Kiessling and Theodor Scharnagel, were both peasants' sons (Kreutz, 'Ludwig Kiessling'; Weller, 'Prof. T. Scharnagel'). In Württemberg Carl Fruwirth, director from 1905 to 1907, was the son of an artist (Dolezal, 'Hofrat Prof. Dr.'), but his successor for the next 25 years, Josef Wacker, was the son of a Württemberg peasant-farmer ('Prof Dr Wacker', 1934; Franz, 'Die Geschichte der Universität', 94-95; HStA Stgt, E14, Nr 1614 (Berufungsakte Wacker). The director of Baden's station from 1908 until 1915, Hans Lang, was the son of a higher civil servant (Schulenburg, 'Hans Lang'), as was Paul Kulisch, director of the experiment station in Alsace-Lorraine (Personalakte Paul Kulisch, MK17473, BayHStA), but the latter's career there and later as rector of the Bavarian Agricultural College displayed a strong commitment to serve small farmers (Harwood,

farmers suggests that they did not harbour the technocrat's illusion that breeding technology on its own would secure development. Lastly, although I would not want to go so far as to claim that the breeding process there was 'participatory' (in the strong sense that emerged during the 1970s and '80s), the overall approach to breeding taken by the stations does suggest a certain respect for the region's farmers rather than a dismissal of them as backward. In part this is noticeable in the fact that in taking traditionally planted 'local varieties' as the starting-point for the breeding process, rather than commercial varieties which were bred by specialists, station breeders were acknowledging that informal breeding activity undertaken by the region's farmers over generations had produced valuable varieties which were well suited to the ecological and economic conditions of the region and which thus constituted a solid foundation for further improvement. The other indication that staff took peasant-farmers seriously is that one of the stations' key functions was to provide instruction in plant-breeding - to interested individuals as well as cooperatives - so that the region would gradually develop its own breeding industry. Although technical assistance continued to be provided for the first few years until the new enterprises were self-supporting, this arrangement still meant that station staff were thereby surrendering their control of the breeding process to smallholders.

Finally, the history of the south German stations clearly illustrates the importance of political support for the success of a development project. This is evident, for example, in the circumstances which led to their establishment. As I have argued elsewhere,[40] the founding of the stations as well as similar peasant-oriented research institutions in Germany around 1900 was in part an attempt on the part of state governments to rein in the growth of peasant radicalism which had emerged during the agrarian crisis of the 1890s. Since peasant leaders were sharply critical of what they saw as government

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Technology's Dilemma, 217-218).

[40] Harwood, 'Research and extension'; Harwood, 'Why did 19thc. states'.

inaction, around 1900 south German ministers took every opportunity to stress how much they were doing on farmers' behalf, not least the establishment of peasant-friendly plant-breeding stations. Rather like GR programmes fifty years later, therefore, the stations were founded with a decidedly political intent. That attempts to establish such stations were not subverted by large land-owners also makes sense in politico-economic context. For in southern Germany an especially large majority of farms were classed as 'small' (less than 12 acres in size); estates (ie, farms of 250 acres or more) made up less than 1% of farms. Estate-owners, therefore, did not command enough political clout to block such moves. (Significantly, no peasant-oriented stations were established in northern or eastern Germany where estates were far more common.) The decline of the German stations must also be understood in political perspective. From the late 1920s, for example, the stations were coming under growing pressure from private-sector breeders who complained repeatedly to government about 'distortions' of the market due to extensive public-sector breeding, but this campaign made little headway since the stations enjoyed considerable public support. The situation changed radically after 1933, however, when commercial breeders managed to win over a few high-level officials in the Nazi agricultural administration, leading to a 'reordering' of the relations between public and private sector breeding in which the stations' freedom to breed for their region's small farmers was substantially curtailed. In short, unlike those development projects of the 1950s and '60s which failed because their aims were out of alignment with those of host country governments, the south German stations were *integrated* within a state agricultural policy which sought - in its own political interest - to promote peasant prosperity. The stations did not, therefore, attempt to make technical improvements to agriculture while steering clear of political issues; they were instead 'politics-driven' right from the start.

Conclusion

The reflective and critical literature on the GR which I have been discussing sought to establish why the programmes of the 1950s and '60s had largely failed and often came to the conclusion that organisational weaknesses, expert attitudes and a neglect of the political dimension had undermined their effectiveness. And yet, successful approaches to development which were evidently unhampered by these problems - in various European colonies, in Japan, and in Central Europe - existed before the first GR was being planned. How is this to be explained? Were the GR's planners simply unaware of the evidence of previous successes and failures?[41]

In a recent paper I tried to find the beginnings of an answer to this question by looking at the early years of the GR in Mexico and asking whether the Rockefeller Foundation's planners and agricultural advisors knew anything about the peasant-friendly European stations or had any experience with peasant-farming themselves.[42] What I found was that the planners did know something about peasant agriculture and about the south German stations and other peasant-oriented breeding work, but they seem to have thought very little about the background conditions in which the Mexican Agricultural Program would operate, certain features of its organisation or the political prerequisites for its success. The result was that although the *initial* approaches taken by the Program were remarkably peasant-friendly, within a few years those approaches were abandoned in favour of a form of breeding better suited to large commercial farms. Many of the reasons for that derailment will by now be all too familiar: the lack of a state extension service or of supporting policy from the Mexican government, the absence of a social

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[41] Ferguson remarks that one World Bank report on Lesotho seemed oblivious to the country's history, especially its colonial history which had clearly shaped its economy (Ferguson: *Anti-Politics Machine*, Chp 2 and passim). And when he asked a development planner in the mid-1980s what he would recommend for Lesotho's future development, the planner replied that he would push the same crop-development plan which had failed 10 years earlier (ibid, 235).

[42] Harwood, 'Peasant-friendly plant-breeding'.

science perspective in the Program, and pressure from the Foundation for quick results as well as its nervousness about making any recommendations which might be seen as 'political'.

Since the Mexican programme served as a model for subsequent GR programmes in Latin America and elsewhere, it would be worth asking whether these later programmes, in turn, managed to learn from the Mexican experience or instead blindly reproduced it. From the critiques of the GR published from the late 1960s, of course, the answer appears clear: that these later programmes also failed to aid peasant-farmers. It might be tempting, therefore, to conclude the paper with a bit of finger-wagging, accompanied by a reference to Santayana's dictum that those who fail to learn from their own history are doomed to repeat it. But this would be to leave important questions unanswered. For if the analysis in this paper is halfway on target, we are now better placed to tease out more precisely where these GR programmes came unstuck. The focus of such questioning ought to be the very earliest stages of a programme when it is being conceived and designed, and it would make sense to distinguish three groups of participants to the process: 'planners' (middle-ranking officers in foundations or aid agencies who rarely leave their desks in New York, London or Washington but who are charged with putting together the programme), 'experts' (natural and social scientists with field experience of development programmes whose advice may be solicited by the planners), and 'decision-makers' (high-ranking officials in the donor agencies with the power to make or break a proposed programme). Among the questions we might pose are these:

- *Were planners simply ignorant?* To what extent did they attempt to learn about the design and impact of previous development programmes? Did they merely read reports issued by such programmes, or did they speak with experts who had first-hand experience?

- *How much attention was paid to the factors discussed in this paper?* For example, was an attempt made to include social scientists in the programme? Were prospective experts vetted with respect to their knowledge of and attitudes toward peasant agriculture? How much consideration was given to the availability of supportive infrastructure and policy in the prospective host country?

- *Were there significant differences of opinion among planners, experts and decision-makers* as to how the programme should be designed? In particular, how often did planners and/or experts suspect that a proposed programme was unlikely to be effective but were overruled by decision-makers on the grounds that poverty-alleviation was not the sole aim?

In this way we might gain a more particular sense of why it is that development programmes so often 'fail to learn' from the past.