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Report of a Seminar

Women and Agricultural Technology: Relevance for Research

Volume 2 - Experiences in International and National Research

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Report from the CGIAR Inter-Center Seminar
on Women and Agricultural Technology
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Asian Women as Users and Beneficiaries of IARC Technology

by

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ASIAN WOMEN AS USERS AND BENEFICIARIES OF IARC TECHNOLOGY*

One reason for establishment of the CGIAR system was to redress the past lack of research on tropical agriculture, which remains the major source of income for the world's poor. The first centers were established with the broad goal of increasing income and food supply for the poor in LDCs. In the past, IARC technology was intended for a broad and vaguely defined user group: the LDC small farmer. More specific user targets were not needed as the major technological breakthroughs in wheat and rice were adopted under a wide range of prices and institutions. The 1981 Quinquennial Review of the CGIAR system notes that "The problems now being faced by the Centres are much more difficult than those faced initially, and they are being tackled against a smaller background of relevant knowledge." (CGIAR, p. 40). Technological breakthroughs now require a clearer focus on the intended clientele and economic environment in order to ensure that technologies are appropriate and will be adopted.

In this paper, a technology user is defined as the farm manager who decides to adopt the technology. Understanding the needs of technology users will help to ensure that technology is adopted, and hence that research has greatest possible impact on agricultural production and income. Besides the farmers who adopt it, there are two other groups affected by new technology: laborers employed in food production and food consumers. These groups are beneficiaries of new technology. Understanding how different groups can benefit from new technology helps to ensure that research benefits those who have least.

This paper considers how a concern for women as technology users and beneficiaries is helpful for ensuring that technology increases output and income, and that it benefits the poor. The following questions are answered:

1. Why consider women as separate technology users and beneficiaries?

2. What impact can IARC technology have on women?

3. What are the implications for research policy?

The paper focuses on women in South and Southeast Asia, and on evidence regarding the impact of new rice technology on their welfare.

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* This is the Asian Regional Review Paper prepared for the Inter-Seminar on Women and Agricultural Technology (Technology Development: The Users' Perspective), Bellagio, March 25-29, 1985. The author is a Visiting Associate Agricultural Economist at IRRI. The views presented here do not necessarily represent those of the IRRI.

1. WHY CONSIDER WOMEN AS SEPARATE TECHNOLOGY USERS AND BENEFICIARIES?

There is now a large body of literature from Asia documenting the major role that women play in all aspects of agriculture. For example, in cultivation of rice alone, women rarely provide less than a third of total labor input and provide more that one-half in Nepal, southern India, Sri Lanka, and Java (Table 1). Their proportional contribution does not decline with development, as it is still 30 to 40% in Malaysia, Japan and South Korea. As rice is about one-quarter of cultivated land in South and Southeast Asia, women's participation in rice represents a substantial contribution to Asian agricultural labor as a whole.

Women participate heavily in the cultivation of other crops as well. They provide roughly half of agricultural labor in the semi-arid tropics of India, where millet, sorghum, groundnuts and chickpeas are major crops in addition to paddy (Ryan and Ghodake). In Nepal, women provide 60 to 90% of labor in cultivation of millet, corn, wheat, and oilseeds (Acharya and Bennett). In the cassava-based systems of upland Java, 30 to 45% of total labor is female (Roche).

Two generalizations about women's labor emerge from the Asian literature. First, women's participation increases with greater intensity of land use. Cross-section studies find that irrigation and double-cropping are associated with greater female labor input in China (Croll) and India (Sen; Rosenzweig and Schultz). It seems that women provide the additional labor when labor use per unit of land increases. As modernization of Asian agriculture is generally equated with technologies that increase intensity of land use, women's participation in agricultural labor can be expected to increase with agricultural growth.

Second, hired wage labor accounts for much of women's agricultural labor. Female labor is 60 to 90% of hired labor in the semi-arid tropics of India (Ryan and Ghodake). On Java, women provide most of the labor in transplanting, weeding, and harvesting of rice, and virtually all of this labor is hired (White). In Indonesia and rice-growing areas of India, women from landless households depend on agricultural labor for their livelihood (Stoler; Mencher and Saradamoni). Rice harvesting alone provides over one-third of women's income in southern India (Acharya and Parker). Thus women's labor contribution is not limited to the family farm. Landless women in Asia participate heavily in agricultural wage labor, and this income is important to them. Women are therefore among the potential beneficiaries of new technology.

Women are also technology users. Within farm households, women are farm managers who supervise agricultural labor and make decisions about purchase of inputs, although the intra-household pattern of decision-making varies widely across Asia. Where men migrate to urban areas as in Malaysia, women may be the sole household decision-makers (Yap). In Nepal women play a major role in all farm decisions and particularly those concerning subsistence crops (Acharya and Bennett). Indonesian women are responsible for contracting, hiring and paying of farm labor (Stoler) and participate in decisions regarding purchase of inputs (White). Women in India travel to the fields to supervise labor and to check on pests and weeds (Saradamoni). In southeast Asia, women generally market the crop output (Chandratat, Watson).

Table 1. Women's Participation in Rice Cultivation.

Country	Seed Selection	Seedbed	Land Prep.	Transplanting	Crop Care: Weeding	Crop Care: Fertilizing	Crop Care: Insect & Others	Harvesting	Threshing	Other Post Harvest	Marketing	Total
Nepal (Hill System)	X		0	64	72			52				54
India												
Andhra Pradesh			7	78	73	8	3	63	25			48
Tamil Nadu			0	69	85	39	8	64	41			55
Sri Lanka (Kandy)												
Irrigated			0	100	80	0	0	49		46		n.a.
Rainfed			0	91	80	0	0	37		67		n.a.
Bangladesh	X									X		
Thailand	X		16	29		33		73			61	n.a.
Malaysia	X	19	6	55	27	19		46	24	76	15	37
Indonesia (Java)				100	53			73				51
Philippines (Central Luzon)			0	45	7			15				19
China		X		X		X		X				33*
Korea	33	27	2	48	23	12	24	34	34	43		36
Japan												40

Percentage of total labor in each activity, where available
X indicates that women are involved in the activity

*Total farm labor in southern region

Sources: Paper presented at IRRI Conference on Women in Rice Farming Systems.
Nepal - Pradhan (1983)
India - Agarwal (1983)
Sri Lanka - de Alwis (1983)
Bangladesh - Abdullah & Zeidenstein (1983); Aziz (1983)
Thailand - Chandratat (1983)
Malaysia - Yap (1983)
Indonesia - White (1983)
Philippines - Sison, et al (1983)
China - Croll (1979); Xue-bin (1983)
Korea - Lee (1983)
Japan - Yoshida (1983)

The fact that Asian women participate in agriculture is a necessary, but not sufficient, condition to consider them as separate technology users or beneficiaries. There are two reasons for considering women's interests separately. The first arises from the frequent observation that women form a disproportionate share of the rural poor (Buvinic). Because of the need to earn a minimum subsistence level of income, women in landless households continue to work even when returns to additional labor are declining (Hart). Women's wage labor participation is then inversely related to household income. Women therefore contribute a greater share of cash income in the poorest households. They contribute about half of household cash income in Java, Bangladesh, and India (Table 2). Because poor women have a greater cash income earning role and continue to have responsibility for household production, they work longer hours in both wage labor and household production than men (Table 2.). Thus women provide crucial support for the poorest households in Asia, both through wage labor and household production activities.

The proportion of rural households that are landless and dependent on agricultural work is increasing in Asia. It is estimated to be 27% in India, 41% in Java, and roughly 12% for the Philippines and Sri Lanka (Barker and Herdt). While growth in industry provides some job opportunities outside agriculture, evidence from the Philippines (Castillo, et al) and Indonesia (Collier, et. al.) indicates that children of farm households are moving into the best-paid urban sector jobs. Landless households do not have the resources to invest in education and thus remain dependent on opportunities in agriculture or the informal urban sector for their income.

Agricultural labor is often the most rewarding type of work open to landless women who are otherwise forced to work for small returns in the informal service sector. Yet women frequently earn less than men and are more often involuntarily unemployed (Lipton). Women's poor earning opportunities stem from their limited mobility and inadequate access to education or even nutrition. Household studies in India and Bangladesh reveal that families do not invest in the health and human capital of their female children (Rosenzweig and Schultz; Chen et. al.).

These "stylized facts" regarding Asian women in the poorest rural households suggest that any concern with increasing income for the poor should include a specific concern for landless women. As women's wage labor participation is inversely related to household income, an increase in women's wages will benefit the poorest households most. Although women in landless households already work long hours, they will benefit from working less only if their subsistence needs can be met from other sources. As long as they are dependent on labor income, increased demand for their labor will benefit them through ensuring that wages do not continue to fall with population growth. Without technological change, increasing population pressure on limited land resources will mean declining wages and increasing returns to land, leading to a deteriorating distribution of income. Technological change that increases both output and demand for labor can offset this trend and slow down the decline in wages. This will raise the income that landless women can earn through wage employment.

Table 2. Women's Work Day and Contribution to Household Income.

	Hours Work Day[a] men/women	Percent Household Cash Income From Women	Percent Full Household Income From Women[b]
Landless Households			
Bangladesh	10.2/10.9	43	n.a.
India	n.a.	53	n.a.
Java	8.8/11.3	44	n.a.
All Rural Households			
Philippines	8.2/10.0	20	38
Nepal	7.5/10.8	27	44

Sources:
- Bangladesh - Halim and McCarthy
- India - Mencher and Saradamoni
- Java - Stoler; Hart
- Philippines - Evenson and King
- Nepal - Acharya and Bennett

[a]Includes household production and wage labor.

[b]Full household income includes value of production on farm and in the home.

Consideration of the rural poor in setting research goals could therefore include concern for women's earning opportunities. Improving women's overall welfare through better access to education and health care requires policies and projects at the national and local level and is certainly beyond the mandates of the IARCs. It should be possible, however, to consider how technology could affect the labor income of poor women. It will be demonstrated below that IARC technology can have a substantial impact on Asian women.

The second reason for considering women as a separate technology user group is because of their role as decision-makers in farm households. Although this role is well documented in the Asian literature, it is not yet clear how it may influence adoption of technology. There is evidence from the African literature that suggest women's managerial role is an important factor in adoption decisions. Although economists traditionally view the household as one decision-making unit, this often is not a good model. Jones finds that household resource allocation is determined by bargaining between husband and wife. This means that the adoption of new technology is not dependent on the decision of a single profit-maximizing farmer. The decision to mobilize household resources for the use of new technology will be more complex than a simple weighing of costs versus returns.

Another important theme from the African literatature is that extension programs and projects tend to ignore women even though they do most of the farming (Dey; Staudt). The result is that technology programs are not successful and that the majority of agricultural producers (who are women) remain less productive.

Asian households differ substantially from African households in the degree to which household members conduct separate economic enterprises. And within Asia, established social institutions governing intra-household allocation of income and decision-making vary widely. For example, women in Java can own land (Wijaya) and control household financial resources used in marketing (Stoler). In contrast, women in Bangladesh devote a significant amount of time to caring for bullocks, but have little control over decisions about when to sell the bullock or how much to sell it for (Abdullah and Zeidenstein). Similarly, women's access to information about agricultural technology also varies widely, as indicated by differences in female literacy rates and extension representation (Table 3).

Nevertheless, there is some evidence indicating that the African issue of recognizing women as separate economic agents may also be important in Asia. For example, Res reports bargaining between husband and wife to determine the method of rice crop establishment in a rainfed area of the Philippines. The wife preferred wet-seeding over dry seeding because the former would suppress weed growth. She did not want to spend time weeding, as her preference was to devote time to vegetables and livestock which provide her with income over which she has direct control.

Another example of women's decision-making role is in Nepal. Acharya and Bennett found that women play a major role in agricultural decision-making (Table 4). Women make the decisions regarding use of organic fertilizer, but the extension program introduced chemical fertilizer and

Table 3. Women's Involvement in Agricultural Education and Extension

Country	% Women Literate	%Women Enrollment in Agricultural Colleges	% Women of Extension Workers
Nepal	5	0	0
India	19	1	n.a.
Sri Lanka	68	28	33
Bangladesh	9	19	n.a.
Thailand	70	26	24
Malaysia	48	n.a.	19
Indonesia	45	20	n.a.
Philippines	81	49	58
China	n.a.	n.a.	n.a.
Korea	81	11	5
Japan	97	n.a.	17

Source: Country Reports and Population Reference Bureau.

Table 4. Farm management decisions in Nepal.

Type of Decision	Sex			
	Male	Female	Both	Total
Labor Allocation				
Arranges Exchange Labor	35.2	35.7	29.1	100.0
Arranges Wage Labor	42.4	29.3	28.3	100.0
Decides Others Work Outside Home	56.2	43.8	-	100.00
Decides Own Work Outside Home	51.7	48.3	-	100.0
LABOR DECISIONS	46.2	39.4	14.4	100.00
Agricultural Decisions				
What Crop to Plant?	18.0	30.2	51.8	100.0
Own or Improved Seed?	20.7	60.4	18.9	100.0
Amount & Kind of Fertilizer	32.5	39.7	27.8	100.0
ALL AGRICULTURAL DECISIONS	25.3	42.1	32.6	100.0
Seed Selection				
Who Does Seed Selection?	10.8	81.2	8.0	100.0

Source: Acharya and Bennett.

credit to men. Acharya and Bennett argue that given women's managerial role, agricultural extension should not be directed solely to men. Unfortunately they did not measure the productivity impact of male-oriented extension, but their results convinced that Nepali government to start a special program to train women extension workers in order to reach rural women.

These examples suggest that even in Asia studies of farm households' willingness to adopt new technologies should include explicit attention to women's role as separate decision-makers. Understanding the role that women play in allocation of household resources can help in the design of technologies that are more appropriate to household needs and thus will have greater impact on agricultural production.

This section has presented some evidence to suggest that women should be considered separately as both technology users and beneficiaries. Farm household women are potential users, and their decisions will influence adoption of new technology. Landless women form a distinctly disadvantaged group among the poor and provide substantial support for poorest rural households. They should be considered explicitly in any discussion of employment impact of new technology.

2. WHAT IMPACT CAN IARC TECHNOLOGY HAVE ON ASIAN WOMEN?

Contradictory statements are often made in the Women in Development literature regarding how technological change will benefit women. On the one hand, there is a call for technologies to eliminate drudgery or to reduce women's work burden. Yet on the other hand there are warnings against introducing technologies that will reduce women's employment opportunities. All writers agree that it is beneficial to raise women's labor productivity, because this raises the returns to their labor.

The confusion arises because an increase in labor productivity is not always accompanied by an increase in labor demand. Where there is a growing supply of landless women's labor, women will only benefit from productivity increases that are accompanied by increased labor demand. Figures 1 and 2 illustrate three types of technical change and their impact on labor use. In Figure 1, point A is the combination of factors used with the old technology. Three new isoquants, representing labor-saving, neutral, and labor-using technologies all allow the same output to be produced with fewer inputs. In all three cases labor productivity increases because the same output can be produced with a smaller amount of labor. The factor proportions vary, however, and thus the demand for labor also varies.

Figure 2 shows the changes in total labor use for the individual farm or household. With a given set of prices, labor amount L_o is used under old technology. With either a neutral or labor-using shift in the response function, it will be profitable to employ additional labor to produce more output. With a labor-saving technical change, however, the total use of labor declines. Any technical change will increase labor productivity, but only neutral or labor-using change will increase total labor use as well.

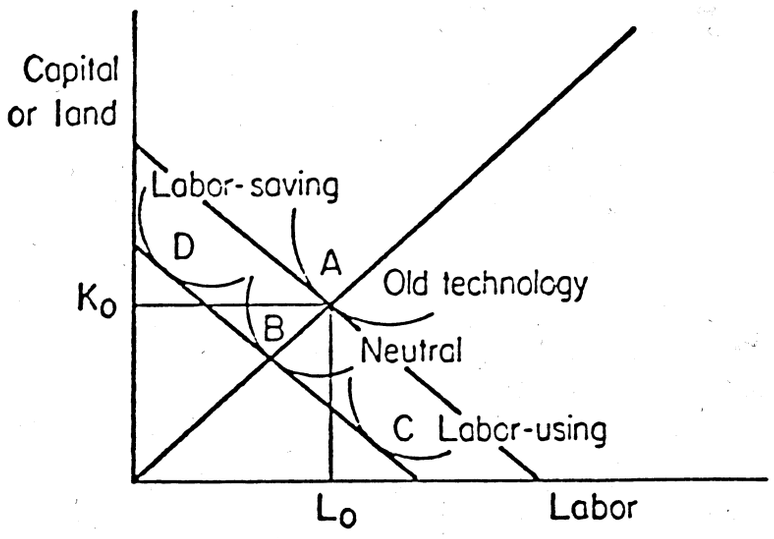

Figure 1. Technical change and factor proportions.

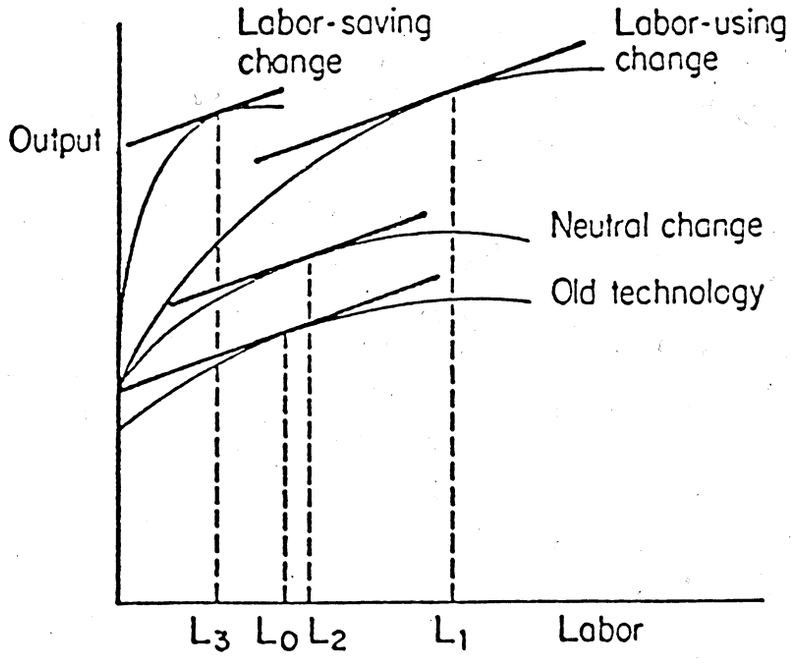

Figure 2. Technical change and labor use.

Whether technical change benefits women also depends on their control over resources. Women in farm households who have some control over the income from land will benefit from any type of technical change in agriculture. This is because they will reap the returns from increased productivity of both household labor and land (ignoring intra-household distribution). Women in landless households whose only resource is labor benefit only from technical change that raises demand for their labor productivity.

As women provide most of the labor in transplanting, harvesting, and weeding of Asian rice (Table 1), labor demand growth in rice production can benefit landless women. Past experience in East Asia suggests that the rice seed-fertilizer technology is neutral or labor-using (Ishikawa). Increased amounts of labor can be applied per hectare and per crop, and at the same time the average amount of rice each worker produces increases. Thus development of improved varieties for the tropics was expected to provide employment in countries currently developing.

In the mid-1960s short-statured, fertilizer responsive modern rice varieties (MVs) for the tropics were introduced by IRRI and national programs. They have been widely adopted by farmers in irrigated and favourable rainfed environments, because their yield advantage is greatest where water management is good. MVs are most widely grown in the Philippines, Indonesia, Sri Lanka, and India (Table 5). They are less widely adopted in the rest of South and Southeast Asia.

MVs generally require more labor than traditional varieties because they require more weeding (due to increased fertilizer use) and the increased yields require more harvest and post-harvest labor. Barker and Herdt review 20 village studies of labor use both before and after MV adoption throughout Asia and find that in 13 cases labor use increased, and in another 3 cases remain unchanged. These findings show gains in labor productivity as well as labor use (Table 6). Increased labor has generally been used in women's tasks: intensification of crop establishment (transplanting in straight rows) and crop care (weeding and fertilizing), and harvesting and processing the additional yield. Furthermore, increased irrigation and shorter-duration varieties lead to increased cropping intensity and more regular demand for labor throughout the year, as demonstrated by long-run trends in Taiwan (Barker and Herdt). As the increase in labor demand is principally for women's tasks, new technology has expanded their employment opportunities.[1].

The adoption of MVs has also been accompanied by increased use of hired labor. In a review of 21 studies of hired labor use after MV adoption, Barker and Herdt found an increase in 16 cases. Not only are the seasonal demands for increased labor met through hiring in, but family labor also declines. In particular, women in farm households shift to more lucrative marketing or sideline activities and provide supervision rather than labor in farm production (Stoler; Illo; Res). Thus, the adoption of MVs not only increases total labor demand, but increases hired labor demand, which should benefit women in landless households.

Comparisons of labor use before and after MV adoption are relatively rare, and studies that disaggregate the data into male and female labor

Table 5. Levels of irrigation, modern cultivars, and fertilizer used on rice in Asia, 1960s and 1970s.[A]

	Irrigation (% area)	Modern cultivars (% area)	Irrigation (% area)	Modern cultivars (% area)
South Asia				
India	38	7	40	37
Pakistan	100	10	100	46
Bangladesh	7	2	12	16
Sri Lanka	61	1[C]	66	56[C]
Southeast Asia				
Malaysia	65	3[C]	67	18[C]
Thailand	28	0	24	10
Philippines	40	22	42	70
Indonesia	65	3	70	55
Burma	15	1	17	12[C]
East Asia				
Japan	100	100	100	100
Taiwan, China	100	100	100	100
Korea, Rep. of	84	0	92	51[C]
China[E]	89	16	89	66

[A]Sources: Modern cultivars data from Herdt and Capule, 1983.
Fertilizer and irrigation data from Palacpac, 1982.

[C]Narrow definition of modern cultivars.

[D]% in indica-japonica crosses.

[E]Includes all provinces except Taiwan; data are assumptions as spelled out re Barker and Herdt (n.d.).

Table 6. Increase in labor, labor productivity and hired labor use with MV adoption, selected locations in Asia.

	Labor use ratio MV/TV (days/ha)	Rice/Labor ratio MV/TV ((kg/day)	Hired labor ratio MV/TV (days/ha)
Indonesia			
West Java	1.6	1.2	1.4
Central Java	0.8	1.6	1.0
East Java	1.1	1.2	n.a.
Bangladesh	1.4	1.1	1.6
Philippines	1.2	1.2	1.7
Thailand	1.4	0.9	n.a.
S. Korea	1.1	1.2	n.a.
Sri Lanka	1.3	1.2	n.a.
India			
W. Godavari	0.9	n.a.	n.a.
Ferozepur	1.0	n.a.	n.a.
Kanpur	1.2	n.a.	n.a.
Palamau	1.7	n.a.	n.a.

Source: Barker and Herdt, forthcoming.

are even more unusual. The ability of new technology and agricultural growth to benefit women laborers is supported by two recent studies in India. In three major rice growing states, Andhra Pradesh, Tamil Nadu, and Orissa, adoption of MVs is associated with greater labor use, and most of the increase is supplied by hired female labor (Agarwal). In West Bengal, areas with greater agricultural intensity and growth in output also have higher female wages and employment relative to that of males (Bardhan).

The above example of how rice technology has benefited women shows that even a very general innovation such as a new variety can have gender specific effects. Thus the biological technologies that form the core of IARC activities can have an impact on women.

3. WHAT ARE THE IMPLICATIONS FOR RESEARCH POLICY?

Most of the IARCs have social science programs to provide feedback about the suitability and impact of new technology.[2] The organization of these programs varies. Some programs are fairly independent of the biological sciences, and consider the broad macro impact of technology while others are closely integrated into the process of technology development and consider micro level determinants of adoption. The goal of all the programs is to institutionalize what Hayami and Ruttan called "induced innovation". This means that new technologies increase the productivity of the scarcest resources and relieve the most pressing economic constraints to production.

Hayami and Ruttan provide the following description of the process of induced innovation through agricultural research:

> "Farmers are induced, by shifts in relative prices, to search for technical alternatives which save the increasingly scarce factors of production. They press the public research institutions to develop the new technology... perceptive scientists and science administrators respond by making available new technical possibilities and new inputs that enable farmers to profitably substitute the increasingly abundant factors for increasingly scarce factors, thereby guiding the demand of farmers for unit cost reduction in a socially optimum direction...the response of research scientists and administrators represents the critical link in the inducement mechanism." (Hayami and Ruttan, p. 57-58).

Social science programs facilitate the critical link between farmers and researchers.

The above discussion of how women form a distinct group of technology users and beneficiaries suggests that it may be appropriate to consider women explicitly within social science programs of IARCs. A research agenda on women would be an extension of existing concerns of social science programs in IARCs. Two questions are suggested by the above discussion of why women constitute a separate group.

First, will the farm household allocation of decision-making influence the adoption of technologies? We need to understand the extent to which

women are separate economic agents within the farm household and their specific managerial control of crop production. We need to understand the constraints on their ability to utilize new technology and whether these arise from their responsibility for household production or their limited access to resources. Such research might fall with the "farming systems perspective" as defined by Byerlee et al of CIMMYT. This perspective considers the complex environment in which small farmer decisions are made, including the heterogeneity of labor resources within the household and multiple objective function of the farm household (Byerlee, et al).

The second question is: what impact could technology have on the earning opportunities of Asian landless women? In order to ensure expanded employment opportunities for landless women of Asia, more agricultural research on labor-using technologies is needed.[3] There is underinvestment in research on labor-using technologies relative to research on labor-saving technologies (Anderson). Because returns to development of labor-saving technologies accrue to private machinery or chemical industries, private research is undertaken by industry. Labor using technologies, such as new varieties, are public goods. Thus research to develop these technologies must be supported by public funds. Because governments tend to underinvest in agricultural research (Akino and Hayami), less labor-using technology is developed. The end result is that farmer's opportunities to substitute capital for labor are greater than their opportunities to substitute labor for capital.

Ryan and Ghodake of ICRISAT sum up the importance of Asian women for agricultural technology design in labor abundant areas:

> "Women, especially landless women, have less chance than men of finding daily wage employment, particularly in the slack agricultural seasons. If this situation is to be improved and not aggravated, new agricultural technologies for these regions must be designed to enhance demand for the tasks generally reserved for females. A large untapped reserve of female labor appears to be able and willing to engage in more market-oriented activities in slack seasons, and it may even exceed the sizeable male reserves. There would thus seem to be excellent scope for designing technologies that would capitalize on this reserve." (Ryan and Ghodake, p.183).

The IARCs are only part of the global agricultural research system. They work with national programs and respond to national program concerns. Although most national agricultural research programs have not considered rural women in setting research priorities, the women's issues discussed above have frequently been identified by national researchers. These individuals are usually in universities and not part of the national agricultural research system, narrowly defined. It should be possible and even desirable for IARC programs to have working relationships with a variety of research institutions in LDCs. As social science work is not usually a major part of national agricultural systems, IARCs might play a role in establishing links between national systems and existing social work in other national institutions.

4. SUMMARY AND CONCLUSIONS

Women participate heavily in agricultural labor and management in Asia. This participation is a necessary, but not sufficient, condition to consider women separately among technology users and beneficiaries. This paper has presented evidence that women do form a group with special needs and interests that are relevant to technology development.

Women in Asia are often farm managers, conducting separate economic activities within the farm household. As potential users of new technology, they face unique constraints arising from their responsibilities for home production and limited access to outside resources. Understanding the role that women play in allocation of household resources can help in the design of technologies that are more appropriate to household needs and thus will have greater impact on agricultural production.

Landless women in Asia participate more in wage labor than women from farm households, and landless women's cash earnings are a major source of support for the poorest households. An increase in wages or employment opportunities for women will therefore have greatest impact on landless households. Any concern for increasing income of Asian poor should include a specific concern for the employment of landless women.

Women participate more in agricultural labor where intensity of land use is greatest. The introduction of modern rice varieties increased the productivity of land and increased demand for labor in transplanting, crop care, and harvesting. Use of hired female labor seems to have increased after the adoption of rice MVs. This should have benefited women in landless households by offsetting the decline in wages caused by population growth. Future development of technologies that increase output and demand for labor will have a positive impact on Asian landless women.

Most of the IARCs have social science programs that are concerned with why technology is adopted by farm managers and how it affects agricultural laborers and food consumers. Such programs provide feedback for setting research priorities, so that research will have greatest impact on production and welfare. As women in Asia form a separate group among technology users and beneficiaries, IARC social science programs should consider them explicitly.

Footnotes

[1] It should not matter whether tasks are rigidly sex-specific. As intensification of land use is associated with greater female labor use and as women have higher unemployment than men, an intensification of land use such as MVs will tend to increase employment for women more than for men.

[2] In this paper, social science includes Economics.

[3] This is not to say that labor-saving technologies would not be appropriate in other regions or parts of Asia where there is little landlessness. Where labor is scarce relative to land, labor-saving technologies may benefit women in farm households.

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