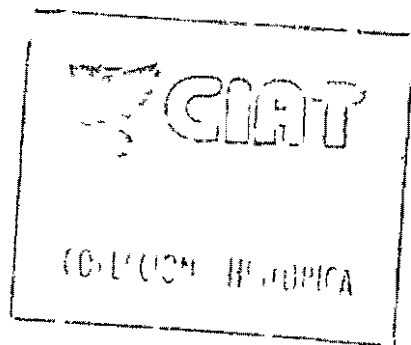


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~~Commercial~~ Rice Farming and Women Colombia

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ABSTRACT

The paper describes the uneven ways technological change in commercial rice farming can affect women in rice producing regions of Colombia. The emphasis is on women's work and on the family health problems associated with the pesticide use of commercial farming. In spite of regional differences, commercial farming appears to have benefitted the wives of rice farmers. But it has not improved the opportunities for the majority of women who work in low paying positions in the service sector or in agriculture.

Several studies now exist that challenge the assumption that agricultural development increases equality between the sexes and improves the welfare of women (Boserup, 1970, Bossen, 1975, Safa, 1977, Tilly and Scott, 1978). Colombia, where rice is the Green Revolution crop, provides yet another example of the uneven ways that agricultural technology may affect the lives of women. This paper will discuss rice production in the Department of Meta in the context of the modernization of the industry as a whole in Colombia (Figure 1). It will discuss the questions raised by this conference on the role of women in rice farming in Meta, the effects of new technology on women's employment, the availability of new technology to women, and the role of women in generating and transferring technology. It will also raise questions on the indirect consequences and family health complications associated with rice farming.¹

For Meta, the paper will show that in contrast to other rice growing regions of Colombia, new technology--irrigation, mechanization and high yield varieties--has not directly affected women's welfare. If the direct effects on women are at best neutral, the indirect consequences need to be considered from a broad perspective that does not consider women as individuated or separated from the families in which they live, or the socio-economic strata to which they and their families belong. It is also important to think of households as embedded in, adaptive to and reflective of regional development processes. It is appropriate then, to begin with a brief

review of the modernization of rice farming in Colombia, and its development in the Llanos Orientales.

HISTORICAL CONTEXT

The division between capitalist and peasant farming in Latin America has been pointed to by several analysts and Colombia's Green Revolution in rice has received special attention in this regard (de Janvry, 1981, Leurquin, 1967, Scobie and Posada, 1977; IICA, 1981). Essentially, the modernization of rice farming in this country consisted of replacing an unmechanized, upland--rainfed--system, planted largely by small farmers using family labor, by a mechanized and irrigated system of production planted by large, commercial farmers using hired labor. The post war policy of import substitution industrialization favored the agricultural production of industrial inputs, cotton, sesame and rice, the latter as a wage good. Irrigation and mechanization were introduced to Tolima and Huila in the 1940's and to Meta in the 1950's. Thirty years later, high yield varieties were developed.

Spectacular increases in rice production were due to a sui-generis collaborative agreement between the Instituto Colombiano de Agropecuaria (ICA), the Rice Grower's Federation (FEDEARROZ) and CIAT (Centro Internacional de Agricultura Tropical) to produce high yield seed varieties, to select technologies and to develop training programs in appropriate cultivation practices (IICA, 1981, IV.54, III 12). The Ley 5a of 1973 was passed in order to develop the institutional framework necessary to ensure the effective delivery of the new technology by linking technical standards of production

to agricultural credit from the Fondo Financiero Agropecuario (FFAP- the Colombian Agricultural Credit Fund).

By 1975, Scobie and Posada were able to state that the positive benefits of technological change all accrued to consumers, "with the lowest income households receiving the largest gain, absolutely and relatively" (1977 78). This was consonant with the country's industrialization policy, and they concluded that as a "wage good, rice represented a dampening effect on the rise of industrial wages" (1977 32).

The negative effects on the upland sector became rapidly apparent, however. The small farms that produced 50% of the country's rice under upland conditions in 1966 were displaced within the decade by the price declines which followed the increased production and economies of scale brought about by irrigation, mechanization and later HYVs (Scobie and Posada, 1977, IICA, 1981, I 17). What this meant for women we shall examine in the next section.

In Meta, which was to become Colombia's second most important rice producing region, the transition from the upland rice system to an irrigated and mechanized system paralleled that of the rest of the country. Upland rice, characteristic of pioneer frontiers, as well as of the central regions of Colombia, had been planted since the turn of the century in Meta. In the Piedmont, it was primarily a "civilizing crop" used to replace tropical forest with pasture. Native varieties, such as rexora, salvatucasa and monolaya were planted a chuzo, with digging sticks, after felling and burning the forest. When yields began to decline after two or three harvests, corn or yucca, and sometimes rice, were interplanted with pasture grass.

Until the mid 1950's, Meta produced only 5% of the county's rice. At that time, two strong migratory currents increased its potential as a national rice producer peasants and workers running away from the social conflict known as La Violencia came to Meta as pioneers, many of them to the newly founded INCORA (Colombian Land Reform Institute) colony in Granada, and wealthy rice farmers came from Tolima and Huila in search of cheaper land and lower costs of production. For a brief period, the expansion of rice in Meta was primarily in unmechanized upland production. But the colonization program foundered in Granada, and most of the pioneers were bought out by second comers, including public works functionaries, Bogota professionals, and other farmers with access to machinery for planting cotton, sesame and corn. The frontier, with its unmechanized upland rice farming moved further south and irrigated rice replaced upland rice, especially after the introduction of HYVs (Leurquin, 1967; Molano, 1981, Leal et al, 1974, IICA, 1981, See Figure 11).

Beginning in 1979, however, there was a spectacular resurgence of upland--rainfed--rice in Meta, but now the upland system was mechanized and favored by the credit and technology facilities of the Ley 5a (Table 1). Three factors caused this resurgence the development of an irrigated variety, CICA-8, that could be planted under rainfed conditions on alluvial soils at lower costs and equal--sometimes higher--yields (Jennings et al, 1981, Martinez, 1982), the decline of markets for corn and cotton which had been planted on the alluvial soils now given over to upland rice, and the need to launder moneys obtained from the production of coca and cocaine on pioneer agricultural frontiers on the border between Meta, Caqueta and Vaupes.

Rice is not a small farmer crop. At the time of the last agricultural census, 1973, 40% of the farms in the Piedmont were below 20 hectares, and there is localized evidence of increased minifundization during the course of the decade (DNP, 1980, CECORA, 1980, ICA, 1982). Rice is rarely planted on such small farms, most of which cluster on the unmechanizeable foothills of the Andes. Around Villavicencio, these farms are for the most part double purpose meat and milk production systems based on Criollo/Cebu herds with some crossing with Brown Swiss, brachiaria decumbens pastures, and family labor.

On the flat lands where rice is planted, a 1981 survey by FEDE-ARROZ showed that although 28.3% of the rice plots were under 20 hectares, these plots covered only 4.6% of the area planted in rice. Fifty two point five percent of the plots in rice were between 21 and 100 hectares, covering 39% of the area, and 19.2% of the plots were over 100 hectares, covering 56.5% of the area in rice. In addition, over 60% of the area planted in rice is rented from ranchers, rentier landlords or farmers who are too poor to plant crops (Fedearroz, 1981, 1981a, Hansen, 1983).²

The introduction of CICA-8, a high yield, relatively low cost variety that could be planted without irrigation on alluvial soils resulted in a great deal of social mobility. During 4 years CICA-8 was planted almost exclusively. While irrigated rice farmers diversified their holdings with plots of upland rice and ranchers began to use rice instead of corn to prepare or renew pastures, the availability of much land for rental brought in new groups of farmers to rice production, professionals and investors rented land for rice, as did

tractor drivers and combine drivers who had worked exclusively as employees before the advent of CICA-8. Finally, some small farmers, who had been excluded by the costs of the crop under irrigation, or who had previously planted corn or cotton, began to plant upland rice. It is probable that the large number of small plots identified by Fedearroz in 1981 are reflections of the CICA-8 bonanza among small farmers. Upland rice was a "new crop" but the Ley 5a requirement that all crops planted with FFAP credit must be supervised by professional technical assistance made the absence of prior experience with the crop unimportant for many of these farmer/investors.

That the introduction of CICA-8 allowed some relatively small farmers to plant rice should not lead us to conclude that this technology began to blur the distinction between commercial farmers and small--peasant--farmers. Even during the peak CICA-8 years the costs of the crop were still too high to permit the poorest groups of farmers to plant it (Table 2). Moreover, rice and its rotation crops of sorghum or cotton are notably absent from the integrated rural development programs that address the small farmers of the Piedmont.

In Meta, as in most of Colombia, rice, including the new upland system, is a capital intensive crop, predominantly planted by urban farmers with access to capital and technology, as these are provided by the market itself. Although the Ley 5a technology delivery system is meant to be uniform for all farmers, Phosphorus Project research on fertilizer choices shows that the professional agronomists, for which all farmers must pay if they are using FFAP credit, deliver their services differently to farmers of different social classes. Distant farmers who live on their farms, and farmers with small fields are

especially vulnerable to neglect from their agronomists, even though they are working within the arena of technified, commercial agriculture (Hansen, 1983).

And when, as in 1982, the demise of a variety coincides with high costs, national overproduction and low prices, delays in payment and mounting interest rates, the credit system rapidly reasserts the difference between small farmers and capitalized commercial farmers. The instability at the edges of commercial farming becomes apparent, as banks foreclose on loans, and refuse to lend to renters or farmers without sufficient land or additional capital to cover their eventual losses. The division between commercial farming and peasant farming is accentuated by these shakeouts.

COMMERCIAL RICE FARMING AND WOMEN'S WORK AND WELLBEING

In order to explore some of the implications of the commercial/peasant farming split for women, we are fortunate to be able to refer to de Leal's four region study on the effects of modernization in Colombian agriculture on the family structure and work of women on small farms (de Leal, 1980). In a pattern that has been described for other times and places in the world, this work shows how in Colombia, intensive land use laws (1926, 1936, 1955, and 1961), the post war industrial policy, and the Violence during the 1950's generally resulted in the removal of small farm families from land they held in non-capitalist tenure forms like sharecropping (aparceria) and "pioneer rental" (colonato). Although the way the process worked itself out was always region specific, the bundling up of exclusionary rights involved in the transition to purely private forms of land tenure also involved changes in labor use patterns. Thus, where rights to land under sharecropping and "pioneer rental" arrangements had involved

family labor obligations, the new pattern was accompanied by free, individual wage labor by separate family members. But who worked, at what, and with what intensity differed, depending on the region's history and the family's social class (de Leal and Deere, 1980. 286).

What happened in Tolima, where the new technologies of irrigation and mechanization were first introduced will provide us with points of entry and contrast for the discussion of the effects of rice technology on women's welfare in Meta. Tolima's traditional products of cattle and tobacco were replaced by cotton, sorghum, sesame and rice. A landless labor force was created on one hand by removing sharecroppers and pioneers from large estates, as in Guamo and Saldaña. Elsewhere, as in Espinal, where estate owners found sub-division and sale the best response to intensive land use laws, new groups of farmers, independent peasants, ex-sharecroppers, bureaucrats and professionals began to plant the new industrial crops (de Correa, 1980).

In general, the work of women on Tolima farms was found to provide a household--and regional--labor reserve. The nature and intensity of women's on-farm and off-farm work depended on household resources and on the male earning situation. Where labor could be hired, it was, and women performed few agricultural tasks, limiting themselves to the specifically female activities of cooking, cleaning and washing. But as wealth decreased, women provided the necessary secondary incomes. Where small farm women had participated in the sowing, harvesting and processing of upland rice, their crops and their work were replaced by the greater production of mechanized, irrigated fields and industrial processing mills. At first, small farm women began taking jobs as day laborers in cotton and sesame fields. But increasingly, as wages replaced farming as a main

source of income for small farms, the pattern developed that men worked for part time wages for half the year, and women for about a quarter of the year. The greater the poverty, the greater flexibility developed in the distribution between men and women of the traditionally feminine activities of social reproduction cleaning, cooking, washing and child care.

The seasonal jobs that women took, often with their children, since they were paid piece rates, were during peak periods of thinning, weeding, and especially, harvesting cotton. Where holdings were below 3 hectares, families exported daughters--but not mothers, because the work of mothers at home could not be foregone--to towns like Espinal, Ibaguá and Bogotá to work as factory workers in cotton mills, or cleaning women in industry and commerce, and especially as domestic servants. Thus, the freedom of women to enter the labor market was related to the pressure of family poverty, and where new technology displaced women from agricultural tasks, many were absorbed by urban labor needs in service, industry and commerce (de Correa, 1980, de Leal and Deere, 1980⁰, cf. Rubbo and Taussig, 1977).

In addition to changes in land tenure and work patterns, commercial agriculture brought yet other consequences for Tolima country women and their families that remain incompletely understood in their long range implications. In 1974, Dr. Marco Micolita, the director of the Guamo hospital, called attention to an "epidemic" of spontaneous abortions and premature and malformed births, especially during harvest periods. The working and resident small farm population clustered around the large fields of cotton, sorghum and rice had apparently been exposed to heavy spraying with herbicides based on the components of Agent Orange, 2,4D and 2,45T. The subsequent investigations

brought to public light the dangers of pesticide intoxications, the conflicting interests surrounding the manufacture, sale, export and import and licencing of pesticides, the harmful effects of pesticides on the male reproductive system and libido, and the high rates of contamination of commercial foods with organochlorides such as Aldrin, Endrin, Dieldrin and DDT (Castro Caicedo 1974a, 1974b, Grupo Ecologico del Tolima, 1977, 1978a, 1978b, 1978c, 1982; and see Lomeli, 1982, Weir and Shapiro, 1982).

The decreasing number of deaths from intoxications, abortions and suits brought by workers between 1976 and 1981 coincided with a greater control of pesticide use, and also with a decline in cotton farming attributed to the high costs of imported pesticides (Grupo Ecologico del Tolima, 1981).

In Tolima, then, new technology in rice, but also--and importantly--in other crops like cotton, resulted in an overall process of proletarianization which affected men and women to different degrees. The families remaining in the countryside were exposed to health hazards of commercial pesticide use, but urban populations are also at risk through the residues in the foods they buy.

In Meta, the same technology of commercial rice farming had somewhat different implications for women's work, wellbeing and family health. Over time, three factors seem to account for a much lesser degree of proletarianization among farm women than in Tolima, and an apparently very large number of urban working women. First, the semi-frontier condition of the department at the onset of agricultural modernization allowed it to absorb a highly mobile and young migrant population. Second, the labor saving and male bias of completely mech-

anized agriculture limited women's wage work to cities, and finally, the emergence of the coca frontier on the fringes of the Amazon Basin, in southern Meta, Vaupes and Caqueta, provided young men with a lucrative option and relieved the pressures on small farm families that might otherwise have pushed women out to look for wage work in a glutted market.

Thus, although many migrants to Meta established small farms in the Piedmont and in Granaca, by 1980 59% of the population was urban (Ministerio de Salud, 1982). In the Piedmont municipalities, the proportion of urban residents reached 75.5%. The vast majority of rice farmers and the workers they hire live in towns. When, as during the cotton harvests of the 1970's, large contingents of labor were needed, these were provided by seasonal workers who came to Villavicencio at harvest time.

Because rice and its rotation crop of sorghum are so highly mechanized there are few jobs available for women there are in the commercial crops that are incompletely mechanized, or depend on tasks that cannot be mechanized, such as cotton in Tolima, cane in Valle and flowers in Bogota. In Meta commercial farming is an almost exclusively male domain in production and processing, as well as in research and technology transfer. The farmers themselves are almost all men. A survey of the inscriptions of farmers for credit in two subregions of the Piedmont showed that of 172 farmers counted, 16 were women (9.3%). frequently identified as widows. There are no women among the 97 members of the rice farmer's cooperative (COAGROMETA) and at farmer meetings, for example, to discuss support prices, marketing or produc-

tion costs, the one or two women present are barely visible among the men.

There are no women in the fields.

A little more employment for women is provided by the urban industrial side of rice production. Eighteen percent of the labor force of the five main agro-industries in Veillavicencio is female. Women are primarily in clerical and cleaning positions--65% and 21.8%, respectively--in a pattern which is probably common to many Colombian businesses (Tables 3+4)

The same pattern held for the ICA regional offices. ICA is charged with developing and transferring agricultural technology for the region and with licencing and monitoring the technical assistance provided by private agronomists to rice farmers. Twenty three per cent of ICA's labor force is female, and again women predominate in the clerical and cleaning categories (57% and 23.8%). There are no women in the rice program, or in the soils program. And there is no woman listed among the 87 professional agronomists licenced by ICA (ICA, 1982[~] 14). Of the five professional women in ICA, one works in administration, the second is a vet, and the third is a bacteriologist. The last two work in the Rural Development Program (DRI) as home economists, and are assisted by five home-improvement semi-professionals ("Technical assistants"), in recently introduced programs to increase the productivity of very small farms by extending technology and credit to the activities that wives undertake on these farms. chicken and pig raising.

If we are to trust the training programs available to women in the Llanos Piedmont, at the Technical University of the Llanos Orientales, and the Government Apprenticeship Service, SENA, the

the number of women in rice related activities is not likely to change in the immediate future. Figure 3 shows that the largely middle income women who enter the University prefer to enroll in, and are more successful in completing the training for the traditionally feminine teaching and nursing fields. In SENA, 58% of the students are enrolled in courses that train them for urban work 62% of the students are women, preparing for jobs in accounting, typing and dressmaking. The two agricultural centers on the outskirts of Villavicencio and Granada train young men from small farms for employment in commercial agriculture and ranching, with an emphasis on tractor driving and repair and general mechanical skills. In the rural courses only 6.4% of the students are women, and the training sector for women is limited to the small farm sector with occasional on-farm demonstrations on improved chicken and pig raising and vegetable gardening (SENA, 1983)

The only job in rice that women are specifically sought for is that of cook, and the distribution of this semi-domestic activity reveals some of the meaning of commercial farming for women of different classes. Women are hired to cook for the work crews on irrigated farms. If the woman is married, a position must be found for her husband as well. She will cook three meals a day and charge a daily flat fee per worker. When the farmer pays the irrigation chief, who has contracted the workers, their meal bills are deducted and given to the cook or to her husband. The position of cook is unstable, because money can only be made at periods of peak labor demand, during the preparation of the fields and during the harvest.

Among upland rice farmers, cooking for workers is done free by the wives of farmers who live on the farm. These women do not work in

the rice fields. They cook on wood stoves, do laundry in rivers, repair clothes and care for their children and husbands. Where farms are small enough and close enough, wives may run a small business out of their homes, selling soda, beer, cigarettes, soap and sometimes milk. On farm work includes the care of small animals and occasionally, milking cows. Where labor is scarce, or cannot be afforded, wives and their children will participate in planting, weeding and harvesting yucca or plantain. In two exceptional cases, one wife worked nights with her tractor driving husband preparing and liming their rice field, and another shared the management--applications for credit, discussions with agronomist, purchase of inputs--with her sick husband.

But where the upland rice farmer lives in town, the wife of an administrator, or another regular worker is hired to cook for the occasional workers needed to fertilize or chop weeds, and for the harvest crews. The wives of upland rice farmers and irrigated rice farmers who live in town are rarely involved in farming. Those who are, as with accounting help or chopping for inputs, are seen as exceptionally as are the on-farm wives who work in rice. Table 4 shows the distribution of cooking for workers and other rice related activities among the wives of 33 upland rice farmers interviewed in 1982. Interestingly, two of the women in this group were listed as the farmers receiving credit for rice cultivation. In fact, neither participated in rice farming. The husband of one oversaw the planting of his rented field, and the male partner of the second farmed the woman's land in an arrangement by which she contributed the land and he the management. They shared costs and profits.

Table 4 also shows that in this sample, most of the wives do not have employment outside of their homes. They are housewives, but the cooking, childcare and housecleaning is done for the most part by hired servants. In no case have I heard of a domestic servant who is the daughter of an upland rice farmer. Rather, domestic servants, who are all believed to be of local rural origins, seem to come from the non-commercial farming sector, from the small farms of the Piedmont, or from cattle ranches deep in the Llanos.

There are no comprehensive statistics by sex on the labor force in Meta which we can use to place these data in perspective. We must depend on the estimates of SENALDE, the national employment service, and those of the Bank of *the Republic*. According to SENALDE, unemployment in Villavicencio is estimated at between 10 to 12% of the economically active population. There are no estimates of the size of this population in Villavicencio, but for Meta as a whole it is thought to be about 35% of the population (SENALDE, 1983, Nieto et al, 1978). According to SENALDE, which places men and women in jobs in Villavicencio, the supply of women and the demand for women is greater than that for men 65 % of job applicants are women and 57% of employers are looking for women. Most of the applicants of either sex are unqualified workers, and about 60% of the positions available are for unqualified labor. Of the three categories of jobs that SENALDE fills, office work, commerce and sales, and services, the category of office work is the only one in which the demand for male workers is greater than for women, by 13%. The demand for women in commerce and sales is 20% above that for men, and 75% above that for men in the service category, which includes positions as assistant cooks, waitresses and office cleaning women (SENALDE, 1983).

These proportions do not include agricultural workers, or the large transient population of men working in the petrol fields, or the visibly large numbers of self employed women who sell cooked food on the street, or those who work in domestic service, but they do indicate clearly the high degree of urban proletarianization among women, and the low paying nature of the positions available to them.

This is the perspective from which to view the situation of the wives of rice farmers, and also women working in rice related industries. They comprise a most privileged minority and an urban, feminine representation of one side of agricultural dualism. Considered alone, their situation lends general support to the observations that women's distance from productive work increases with household wealth, and that the main benefits to women from commercial agriculture stem from the husbands increased earnings, in the case of farmers' wives, and from the increased demand for goods and services, in the cases of urban women who must work for wages (de Leal and Deere, 1980 276).

However, the benefits accruing to women as a result of increased male incomes must be considered in the context of the total employment provided by commercial agriculture. According to the Bank of the Republic, in 1980 agriculture and ranching employed a relatively small proportion of Meta's population 13%, as opposed to 43% in commerce and services, 9% and 7% respectively in manufacturing and construction, and 28% in "other," "informal" activities (Banco de la Republica, 1981 60-61).

The latter figure is the official estimate of the proportion of the population employed in the production and distribution of coca and cocaine. It is probable, then, that coca production has brought

more wealth to the Piedmont and more demand for the goods and services that absorb urban women's work than has new technology in commercial rice farming. Visits to the small dairy farms in the Piedmont, which are managed by women and children because the men have gone to work in the coca fields ("se fueran para abajo") also suggest that the earning opportunities that coca provided for men from small farms has delayed the proletarianization of women from such small farms.

Finally, whatever the benefits to urban women brought by the cocaine economy, the rural family health issues associated with the pesticide use of commercial rice farming have become more complex. In addition to the dangers of pesticide poisoning and potential reproductive damage, we also need to consider the rising rates of infection with malaria. As in Tolima, whole hamlets in Meta have been fumigated, streams poisoned, birds, fish and farm animals killed. The distribution of population, crops and jobs suggest the spraying is less intensive, the population density less and the population at risk is predominantly male. Nonetheless, an ICA study of aerial pesticide application found that all the safety and environmental were regularly ignored (Brinez, 1980). Humans have been seriously intoxicated, especially with organophosphates, and doctors in Villavicencio have also noted that women are delivering more malformed babies.

The magnitude of the problem is almost impossible to gauge because of under reporting, and disperse, irregular and unfocused record keeping. Thus, that the incidence of malformed births increased ^{between 1951 and 1982} from 10 to 40 { in the Villavicencio Regional Hospital is a virtually useless datum if the registry forms from which it is constructed do

not include family occupational health histories as well as the woman's pregnancy history (*Hospital Regional de Villavieja, 1983*)

The situation is somewhat clearer with regard to malaria. It has been shown that the use of insecticides in commercial agriculture --especially in cotton, but also in rice--has contributed to the resurgence of malaria in many parts of the world (Dezowitz, 1981 50-51, Pant and Gratz, nd, Chapin and Wasserstrom, 1981, Bull, 1983). In Colombia, the incidence of malaria tripled during the 1970's and almost doubled in the Department of Meta (Table 5). The increases in the Piedmont municipalities are, in many cases, dramatic.

It does not appear that the insecticides used in commercial rice farming are responsible for the increase. This is because the most numerous and troublesome anopheles mosquito of the Piedmont, An. Alopha, resistant to DDT, is a poor vector for malaria plasmodia. An. Darlingi, which is responsible for most malaria infections, and is ^{not} resistant to DDT, is a shy forest mosquito, whose population expands during the early, frontier, stages of chopping, burning and settling in the moist tropical forests south of Meta. In the coca planting area of Miraflores, over 20% of the larvae found by the Malaria Erradication Service (SEM) in 1982 were An. Darlingi, whereas in the Piedmont their count was well below 10% (*SEM, 1983*).

The high rates of infection in the Meta Piedmont should not be interpreted as resulting from the pesticide technology required by high yield varieties they are rather reflections of the high rates of migration between the Piedmont and the frontier coca producing region. These rates of migration, however, can reasonably be understood as adaptations to the low employment offered to men by commercial rice production and ranching.

CONCLUSIONS

This paper is a contribution to the literature that shows that regional development patterns affect women's work and welfare in different ways regardless of the similarity of the agricultural technology in use. It has emphasised women's employment and family health issues. In Tolima, women from the small farm sector were pushed out to work for part time wages in agriculture, whereas in Meta, farm women do not work for agricultural wages. The urban labor force, however, is predominantly female. Even the health issues associated with the technology of producing commercial crops assume different casts in each region. The especially fragmentary understanding we have of the effects of pesticides on reproductive malfunctions argues for the importance of long term, epidemiological research on this personally and politically sensitive issue.

But there are overarching similarities. Within the commercial rice farming sector the opportunities for women are very limited and the benefits seems to have been captured by the wives of Meta *Rice* farmers. Over all, most women in both regions are concentrated in low paying positions in commerce and services, and in Tolima, in agriculture. This seems to be a consequence of the very growth of commercial agriculture and its limited employment opportunities. The political and economic power underlying this type of agricultural development do not auger an improvement in the opportunities for women.

In closing, an example from Tolima is instructive in its ambivalent implications. A rice farmer, nationally known for his pro-

gressive agricultural practices found that the cost of weed-killers was raising his costs of production beyond an acceptable level. He planted a seedbed on 7 hectares for transplanting to his 200 hectare fields. Other farmers were astounded at his decision to hire labor rather than to use herbicides, they assumed the labor costs would be superior to the herbicide bill. In fact, the labor costs were about \$25.00 less per hectare than the herbicide costs. In addition, savings on water, seed, fertilizer and insecticides brought his total costs of production to about \$1,000.00 per hectare, in contrast to the average regional costs of production of \$1,500.00 per hectare. He also pointed out that this was a socially responsible technology because it brought jobs to a region of great unemployment. According to him, during the first year he adopted transplanting, "even the prostitutes from town" came to work transplanting his rice, and to his surprise, he found himself with a largely female labor force. He speculated on women's greater ability to bend down without being susceptible to back pains.

This year, when I visited his fields, there was only one woman working among 45 men. The work is paid by piece rate, and since this woman brought her four sons ranging from 14 to 20 years to work with her, she earned a great deal more money than did her male co-workers, or indeed, her tractor driving husband. When I asked where all the other women were who had worked transplanting rice on these fields, she explained that most women found this work supremely disagreeable because of the heat, the mud, and the bending. They preferred to work in the shade, classifying tobacco, or in weeding, thinning and picking cotton. At the time of my visit cotton was being harvested by women

and their families, and by teams of migrant laborers of both sexes,
and also by the first cotton combines introduced to Tolima.

FOOTNOTES

1. This paper was written while on a post-doctoral fellowship from the Rockefeller Foundation to work with the IFDC/CIAT Phosphorus Project on farmer fertilizer selection and use in upland rice. I greatly acknowledge the support I have received from the three institutions.
2. In Meta rice is grown at 400-450 masl on medium to low terraces and river banks. The average temperature is 25° C, ranging between an average of 31° C in the hottest months of February and March and 21° C in the coldest months of July and August. Rainfall averages 2789 mm, with the rainy season beginning in March. The dry months are December, January and February. The relative humidity is highest in June (85%) and lowest in February (65%) (Owen and Sanchez, 1979, Martinez, 1982). The soils of the Piedmont are variable, characterized as oxisols because of their general acidity, high concentration of iron and aluminum, and low nutrient content, especially in Phosphorus and Potassium (Owen and Sanchez, 1979, Laing et al, 1982 46). Piedmont soils have been classified according to their potential crop use, and irrigated rice is grown on the less fertile, low phosphorus Class III and sometimes Class IV soils. Upland rice is grown on the far more fertile Class II soils, on the low vegas, or bottom lands along the rivers that cross the Piedmont. As farmers have abandoned cotton production, rice is also grown on Class I soils, which are the best soils of the Llanos (Owen and Sanchez, 1979).

Table 1 Hectareage in irrigated rice, upland rice, corn, cotton and sorghum, Meta 1978-1982¹

	Irrigated Rice	Upland Rice	Corn	Cotton	Sorghum
1978					
A	32 540	6 267	9 946	--	--
B	10 136	--	--	16 884	4 918
1979					
A	25 480	9 284	4 244	--	--
B	11 766	--	--	12 957	9 525
1980					
A	24 218	14 278	5 589	--	--
B	10 995	--	--	6 665	9 987
1981					
A	27 942	17 689	2 178	--	--
B	17 022	307	31	1 621	10 170
1982					
A	41 079	38 825	2 322	--	--
B	13 998	252	343	3 275	16 259
1983					
A	27 701	23 006	2 068	--	--

¹ A and B refer to the semesters, from January to July (A) and from August to December (B)

Source ICA

Table 2. Costs of Production for major crops of the Piedmont, Meta.

<u>Crops</u>	<u>Time to harvest</u>	<u>Pesos/ha 1982</u>	<u>Dollar/ha 1982 a</u>
Irrigated rice	1 semester	64.964.00	866.00
Upland rice	1 semester	51.089.00	681.00
Cotton (1981)	1 semester	54.000.00	720.00
Corn (unmechanized)	1 semester	19.617.00	261.00
Corn (mechanized)	1 semester	30.655.00	408.00
Yucca	3 semesters	15.032.00 b	200.00
Platano	6 semesters	21.771.00 b	290.00

a- 75 pesos= \$US 1.00

b- calculated by dividing establishment and maintenance costs by semesters.

Sources. Fedearroz, 1982
ICA/DRI, 1982
Banco de la Republica, 1982

Table 3.

Employment of Men and Women by Categories in Public and Private Sector Rice-related Activities

	M E N								W O M E N																	
																	Totals Both Sexes									
	Admin		Clerical		Prof		Techn		Labor		Totals Men		Admin		Clerical			Prof		Techn		Labor		Totals Women		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	n
A	(36)	95	(2)	5	(37)	88	(42)	96	(99)	85	(216)	77	(2)	5	(36)	95	(5)	12	(2)	4	(18)	15	(63)	23		279
I	(2)	100	(0)	100	(10)	91	(22)	79	(5)	100	(39)	86	(0)	-	(3)	100	(1)	9	(6)	21	(0)	-	(10)	14		49
cc o- is- s	(50)	99	(6)	14	(19)	95	*		(211)	95	(289)	82	(6)	11	(36)	86	(1)	5	(0)	-	(12)	5	(55)	18		344
als	(88)	92	(8)	10	(66)	90	(64)	89	(318)	91	(544)	81	(8)	8	(75)	90	(8)	10	(8)	11	(30)	9	(128)	19		672

* Private Sector groups Technicians with Labor

Table 4. Distribution of positions by sex in Public and Private Sector rice related and agricultural technology research and transfer activities.

	<u>MEN</u>					<u>WOMEN</u>				
	<u>Admin</u>	<u>Clerical</u>	<u>Prof</u>	<u>Tech</u>	<u>Labor</u>	<u>Admin</u>	<u>Clerical</u>	<u>Prof</u>	<u>Tech</u>	<u>Labor</u>
ICA	16.7	.93	40.7	44.4	39.4	3.2	57.1	7.9	6.4	23.8
DRI	5.1	0.0	25.6	56.4	12.8	0.0	30.0	10.0	60.0	0.0
Rice Agro Indus- tries	17.3	4.8	6.6	--	74.1	10.9	65.5	1.8	0.0	21.8
TOTALS	16.2	1.8	12.1	11.8	58.5	6.3	58.6	5.5	6.3	23.4

Table 5. Participation of Upland Rice Farmers' Wives in
Rice Production

<u>Activities</u>	<u>City Residence</u>	<u>Country Residence</u>
Cook for workers	1	15
Other rice work	2	3
No work in rice	12	12
Work out of home	1	-
Total wives	14	16

Table 6. Index of annual cases of malaria per 1000 inhabitants.

	<u>1970</u>	<u>1975</u>	<u>1980</u>
<u>Total Colombia</u>	1.2	2.2	3.4
<u>Total Meta</u>	3.8	5.0	6.1
<u>Piedmont Municipalities</u>			
Acacias	3.0	5.3	6.9
Castilla	1.7	1.8	7.8
El Castillo	-	-	46.2
Guamal	1.4	.6	3.6
Restrepo	2.9	1.2	3.3
Cubarral	.4	1.1	7.7
S. Martin	3.8	2.6	4.1
Fuente de Oro	8.1	3.9	.9
Cumaral	6.6	5.3	12.0
Granada	2.6	.9	1.0
<u>Sub-total</u>	3.3	2.5	7.7
Villavicencio	.9	4.0	1.4
<u>Frontier</u>			
S. Juan de Arama	8.9	4.3	3.9
Vista Hermosa	13.8	28.5	26.9
Puerto Lleras	33.0	22.9	11.6
<u>Sub-total</u>	18.0	14.7	14.4
<u>Rest of Meta</u>	2.8	1.6	3.3

Source Calculated from population and case figures provided by SEM, Bogota.

Figure 1 Colombia and Meta



Figure 2 The soils of Meta

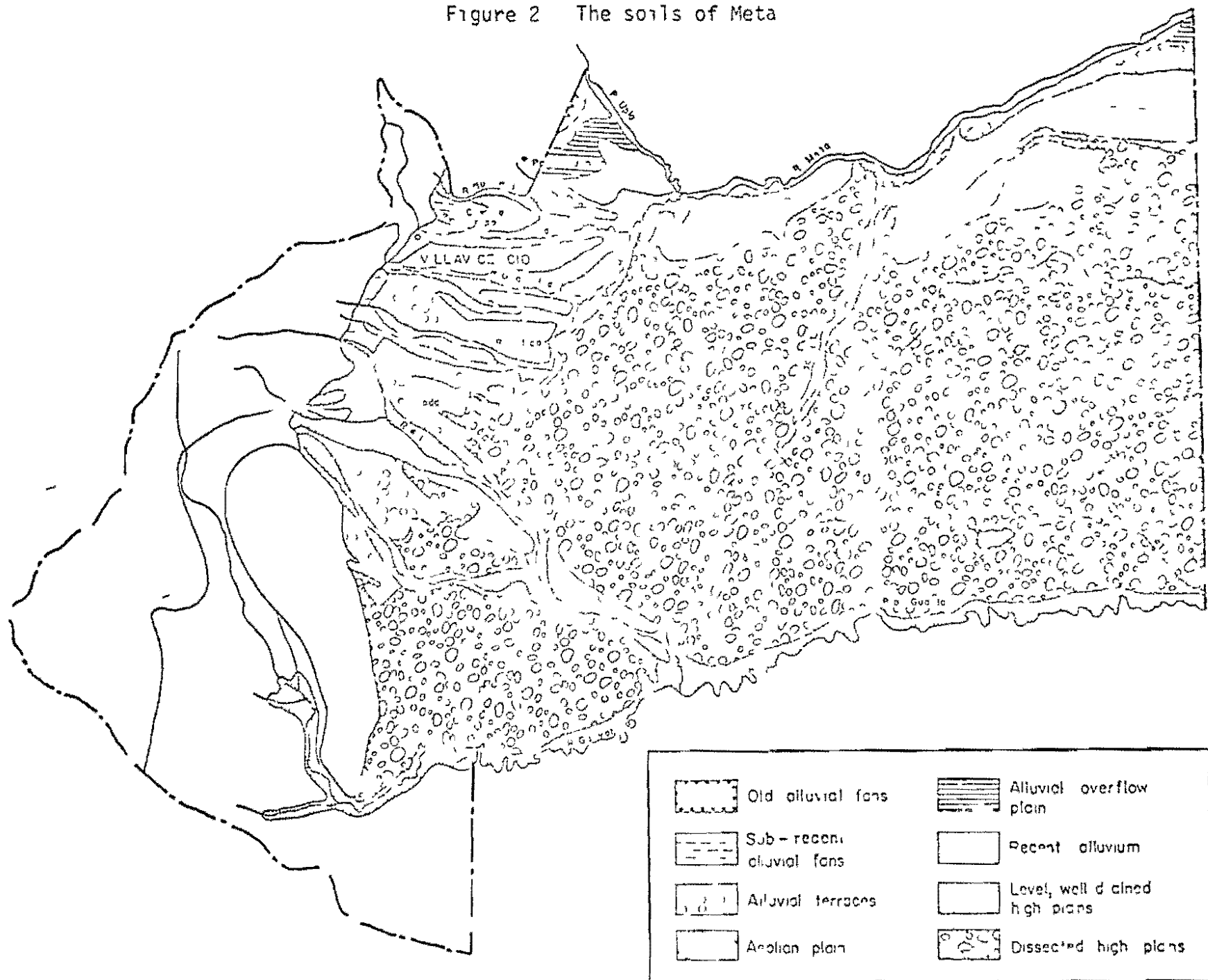
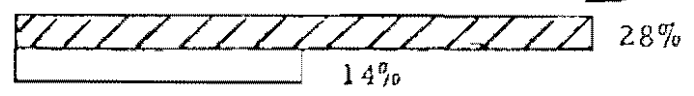


Figure 3

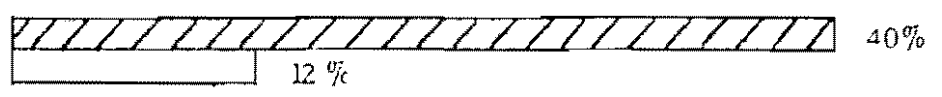
Career Choices - Men and Women
Entering Classes 1981 & 1982
Technical University of the Llanos
Expressed in Percentages

Total entering 492 = 56%
Total entering 389 = 44%

Men 
Women 



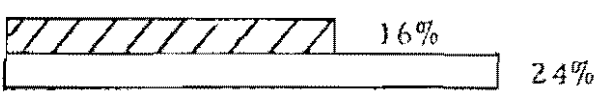
Agronomy



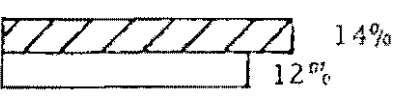
Vet Medicine



Nursing



Farm Sciences Teachers



Physical Sciences
Teachers

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