Production Conditions in Contemporary Punjab Agriculture

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Punjab agriculture has made rapid strides since independence. Peasant proprietor dominance of the agrarian structure, early completion of consolidation of holdings, state's role in creation of irrigation facilities and a hard working peasantry are some of the factors which contributed towards early progress. After adoption of new agricultural technology in the mid 1960s Punjab made tremendous progress and within a few years the state emerged as a heartland of India's successful green revolution strategy. The new technology led to far reaching changes in the state's agrarian structure. However by 1990 the momentum of growth had petered out and the state is now faced with a new set of problems which are defying easy solutions.

Introduction

Punjab agriculture has made rapid strides since independence. Peasant proprietor dominance of the agrarian structure, early completion of consolidation of holdings, extension of irrigation facilities and a hard working peasantry are some of the factors which contributed towards early progress. After reorganization of the state in 1966, which incidentally also coincided with the advent of new high yielding varieties (HYVs) of wheat, rice, maize and bajra, the pace of development was further accelerated. Adoption of new agricultural technology consisting of hybrid seeds, chemical fertilizers, insecticides, pesticides, herbicides and modern agricultural practices set Punjab agriculture on to a new growth trajectory. Within a few years Punjab emerged as a heartland of India's successful green revolution strategy. This led to far reaching changes in the state's agrarian structure. However, it must also be recognized that Punjab's agrarian structure would not have been what it is today if the country had not opted in favour of technological solutions to solve the chronic food shortages with which it was faced in late 1950s and early 1960s.

Between 1970-71 and 2000-01 production of wheat has gone up more than three times from nearly five million tons to more than 15.5 million tons (Table 1). In fact if we compare the production of wheat in 2000-01 with the production figures in 1960-61 (when it was 1.7 million tons) then during these forty years it has gone up by more than nine times. Similarly, production of rice, the other major crop of the state, has gone up more than thirteen times between 1970-71 and 2000-01. Total food grains production in the state has also gone up by more than three and half times. Yields of both wheat and rice have more than doubled during these thirty

years. The proportion of area irrigated has gone up from 71 per cent of GCA to 94 per cent of the GCA. Use of fertilizer (NPK) per hectare was 38 kg/ hectare in 1970-71, it was 179 kg/hectare in 2000-01. Number of tubewells and pump sets has gone up from 19,200 in 1970-71 to 935,000 by 2000-01. The number of tractors in the state was 30,000 in 1970-71; it is more than 4 lakh in 2000-01. Intensity of cropping has jumped from 1.40 in 1970-71 to 1.86 by 2000-01. The point we are trying to make is that in terms of use of modern inputs as well as production of food grains, Punjab agriculture has achieved remarkable progress since the adoption of modern technology in the late 1960s. It has also led to major changes in the structure of the economy and has in the process thrown up a new set of issues and problems which are now creating difficulties for planners and policy makers. The rest of the paper is devoted to the explanation of those issues and problems which Punjab agriculture is now faced with and how this technology has affected the structure of state's agrarian economy, the nature of tenancy in the state and employment prospects of agricultural labourers and their incomes.

Table 1: Some Selected Indicators of Growth of Punjab Agriculture

Indicator	1970-71	1980-81	1990-91	2000-01
Wheat production (MT)	5.1	7.7	11.7	15.5
Wheat yield (kg./ha.)	2238	2730	3715	4563
Rice production (MT)	0.7	3.2	6.7	9.2
Rice yield (kg./ha.)	1765	2733	3229	3506
Total foodgrains (MT)	7.3	11.9	20.0	25.3
Total foodgrains yield (kg./ha.)	1860	2456	3391	4033
All commodities production index (triennium ended 1969-70 = 100)	109.76	170.23	269.55	332.59
Cropped area irrigated (%)	71	81	94	94
Nutrient (NPK) use (kg./ha.)	38	113	163	179
Total tube wells ('000)	192	600	800	935
Total tractors ('000)	30	119	265	435
Gross cropped area (m./ha)	5.7	6.8	7.5	7.9
Net cropped area (m./ha)	4.0	4.2	4.2	4.3
Cropping intensity (%)	140	161	178	186

Source: *Statistical Abstracts of Punjab*, various issues.

Changes in the Agrarian Structure

Since the introduction of the green revolution technology, the agrarian structure of Punjab has witnessed interesting changes. In the first phase extending up to 1980-81, the number of marginal and small holdings declined sharply, while those in the higher-size categories showed a modest increase. These changes occurred primarily due to three reasons. First, with the onset of the green revolution technology, crop production activities became economically attractive, which created an active land-market for leasing and selling land. Secondly, progress of agriculture under the green revolution technology created additional employment opportunities in the non-farm sector. These encouraged many marginal farmers either to sell their land or lease it, to earn higher incomes from non-farming jobs. Finally, the new technology turned out to be more attractive to the large farmers, mainly because the mechanical inputs associated with it were indivisible, and thus uneconomic for use in smaller-size farms.

In the second phase beginning from 1980-81, when profitability in farming started falling and growth of employment opportunities in the non-farm sector became limited, the absolute number of holdings in the state increased, although there was no significant decline in the total operated area. Consequently, the average holding size in the state fell sharply from 4.01 hectare in 1980-81 to 3.61 hectare in 1990-91. All categories except the small farmers registered a decline in average land-holding size. The number of marginal farmers increased steeply from 197,000 in 1980-81 to 296,000 in 1990-91 (an increase of more than 50 per cent), while their operating land base, during the same period, increased from a total of 126,000 hectare to around 164,000 hectare (i.e. an increase of about 30 per cent). Small farms too increased but marginally, with more than a proportionate increase in their total operated area, primarily due to progressive subdivision of medium and large farms under the law of inheritance.

These negative developments in Punjab agriculture appear to have been slightly arrested now. Data from the 1995-96 agriculture census indicated that the average holding size in the state had improved to nearly 3.80 hectare, though it still remained considerably below the level attained in 1980-81. However, except for small and marginal farms, the number of holdings in all other categories of farms has considerably increased. As a result, the average operating land base for all categories of farms has declined, except for the marginal ones. Apparently, the serious unemployment situation in the state has had a telling effect on its agrarian structure.

The distribution of land in three sub-regions of the state revealed that during 1991, the average size of holdings in the sub-mountain region was 2.53 hectare. It was 3.70 hectare in the central region and 3.79 hectare in the southwest region (Table 2). The size-class distribution of holdings in various districts revealed that concentration of small and marginal farmers was the highest in the sub-mountain region, while concentration of large and medium farmers was the highest in the southwest region. Central districts were at the top in terms of concentration of semi-medium holdings.

The present state of agrarian structure points to the fact that marginal and small-

size holdings, though the largest in numbers, are fast becoming unviable. With increasing pressure on land for more production per-unit of area through adoption of modern technologies and use of capital inputs, marginal and small farmers are unable to keep pace with the rapid technological advances in crop production.

Table 2: District-wise Trends in Number and size of Operational Holdings in Punjab.

Region/ District	Total holdings ('000)			Average size (Ha)		
	1971	1981	1991	1971	1981	1991
Sub-Mountain Region						
Rupnagar	65	49	54	1.84	2.61	2.09
Hoshiarpur	1.48	94	98	1.65	2.69	2.64
Gurdaspur	123	100	113	2.11	2.60	2.64
Sub-total	336	243	265	1.85	2.63	2.53
Central region						
Patiala	84	79	96	4.63	4.95	4.05
Ludhiana	91	74	83	3.46	4.44	3.91
Jalandhar	116	75	86	2.44	3.99	3.41
Kapurthala	53	35	39	2.49	4.19	3.63
Amritsar	187	115	124	2.08	3.64	3.52
Sub-total	531	378	428	2.84	4.19	3.70
South West region						
Sangrur	108	90	102	4.16	5.13	4.49
Bhatinda	107	91	102	4.79	5.53	4.80
Faridkot	136	114	107	3.67	4.60	4.83
Ferozepur	158	111	112	2.94	4.46	4.51
Sub-total	508	406	424	3.78	4.89	4.66
Punjab	1375	1027	1117	2.95	4.10	3.79

Source: *Statistical Abstract of Punjab*, various issues.

The scarcity of employment opportunities in the non-farm sector and increasing indebtedness due to increase in cost of inputs and various other factors have made the survival of small and marginal farmers difficult. With growing market demand

for quality produce, suitable technical and credit support needs to be given to marginal and small farmers, to upgrade their skills for the production of quality goods. Given the preponderance of marginal and small farms in the state, the strategy for agricultural production should give more attention to meet their specific requirements. Extension services should be reoriented to cater to the marginal and small farmers. Besides, appropriate policies will have to be designed to generate more off-farm employment opportunities, so that more and more small and marginal farmer can withdraw from agriculture and go for other vocation.

Changes in the Cropping Pattern

The green revolution brought significant changes in the cropping pattern of Punjab. In 1970-71, about 41 per cent of the gross cropped area was under wheat, which increased to nearly 44 per cent in 1990-91 and hovered around 42-43 per cent thereafter. Similarly rice, which occupied around 6.8 per cent of the gross cropped area in 1970-71, increased to over 25 per cent in 1990-91, and then rose further to around 33 per cent in 2000-01. The increase in wheat cultivation has been at the cost of gram, rapeseed and mustard, while that of rice has been obtained through shift in the area from maize, groundnut and millets. Areas under legumes and foliage crops too have declined considerably. Areas under crops such as sugarcane, sunflower, potato, etc., have not remained stable (Table 3). Area under cotton has been adversely affected due to water logging in the cotton belt and pest attack. It is, however, encouraging to see that productivity (Table 4) of most crops has been increasing over the years except for bajra, which in any case is a very minor crop.

Table 3: Shift in Cropping Pattern in Punjab (Area in '000 ha.)

Crop	1970-71	1980-81	1990-91	1999-2000	2000-01
Rice	390 (6.87)	1183 (17.49)	2015 (26.86)	2604 (33.18)	2612 (32.92)
Maize	555 (9.77)	304 (4.50)	183 (2.44)	163 (2.08)	164 (2.07)
Bajra & Jowar	212 (3.73)	70 (1.03)	12 (0.16)	5 (0.06)	6 *(0.08)*
Groundnut	174 (3.06)	83 (7.23)	11 (0.15)	5 (0.06)	4 (0.05)
Cotton (American)	212 (3.73)	502 (7.42)	637 (8.49)	381 (4.86)	358 (4.51)
Sesamum	15 (0.26)	17 (0.25)	18 ' (0.24)	145 (1.85)	19 (0.24)
Sugarcane	128 (2.25)	71 (1.05)	101 (1.35)	108 (1.38)	121 (1.52)
Kharif pulses	33 (0.58)	58 *<0.86)*	73 (0.97)	51 (0.65)	42 (0.53)

Wheat	2299 (40.49)	2812 (41.58)	3273 (43.63)	3388 (43.18)	3408 (42.95)
Barley	57 (1.00)	65 (0.96)	37 (0.49)	51 (0.65)	32 *(0.40)*
Gram	358 (6.30)	258 (3.81)	60 (0.80)	6 (0.08)	8 (0.10)
Rapeseed & Mustard	103 (1.81)	136 (2.01)	69 (0.92)	56 (0.71)	55 *(0.69)*
Potato	17 (0.30)	40 *(0.59)*	23 (0.31)	76.0 - (1.00)	64 (0.81)
Other vegetable	23 (0.41)	24 (0.36)	31 (0.41)	47 (0.60)	46 (0.58)
Fruits	50 (0.88)	29 (0.43)	69 (0.92)	30 (0.38)	34 (0.43)
Net sown Area	4053	4191	4218	4243	4264
Total Cropped Area	5678	6763	7502	7847	7935
Cropping Intensity	140	161	178	185	186

Source: *Statistical Abstract of Punjab*, 1971, 1981, 2000 and 2001

Note: Figures in parentheses indicate area under crops as percentage share to total cropped area.

Area under pulses has recorded a sharp decline. Gram, which used to be the most important pulse crop in the state during the sixties, declined from a level of nearly 360,000 hectares in 1970-71 to less than 10,000 hectares in 2001. Yield of gram, which stagnated till 1990-91, has started improving though given the field levels and price structure of its competing crops it has not yet become attractive enough to arrest the decline in its area and production.

Table 4: Yield (Kg. per hectare) of Principal Crops in Punjab

Crop	**1970-71**	**1980-81**	**1990-91**	**1999-2000**
Wheat	2238	2730	3715	4696
Rice	1765	2733	3229	3347
Maize	1555	1602	1786	2577
Barley	1022	1640	2754	3521
Gram	797	582	744	974
Bajra	1176	1244	1107	703

Sugarcane (Gur)	4117	5526	5941	6265
Cotton (American)	399	329	481	337
Cotton (Desi)*	338	241	285	352
Rapeseed & Mustard	553	567	1003	1117
Groundnut	970	1249	816	969

Source: *Statistical Abstract of Punjab*, 1971, 1981, 1991 and 2001.
Note: * In term of lint

Table 5:District-wise productivity of crops (1999-2000) (kg per hectare)

Region/ District	Wheat	Rice	Cotton	Oil Seeds	Sugar Cane	Pulses	Bajra	Maize
Majha								
Gurdaspur	4362	2831	-	738	68450	560	-	2042
Amritsar	4885	3108	274	932	65870	338	703	2407
Doaba								
Kapurthala	4710	3489	-	1190	55040	500	-	3357
Jalandhar	4925	3487	-	1326	58720	625	-	2949
Nawanshar	4597	3481	-	1216	58060	667	703	2550
Hoshiarpur	3591	2920	-	1030	62010	600	-	2680
Malwa								
Ropar	4022	3112	-	909	54540	592	-	2426
Ludhaina	5064	3611	-	1250	70510	716	-	3122
Firozepur	4648	3509	335	1103	70630	649	703	-
Faridkot	4662	3388	353	1090	60740	425	-	-
Muktsar	4725	3208	344	898	66360	658	703	2577
Moga	4928	3355	280	1187	-	655	703	-
Bathinda	4614	3453	302	1051	-	617	572	-
Mansa	4582	3202	374	1000	66560	765	719	-
Sangrur	4828	3562	346	1050	69720	695	753	2577
Patiala	4800	3248	-	1120	59840	706	-	3050
Fatehgarh Sahib	5148	3679	-	1388	62380	1060	-	2759
Punjab	4696	3347	337	1065	62650	665	703	2577

Source: *Statistical Abstract of Punjab*, 2001.

An examination of district-wise data reveals an interesting pattern in the variability in crop yield (Table 5). Crops such as wheat, rice, cotton and sugarcane, which have now become important in the state, have generally lower inter district variability in their respective crop yields than those which have been marginalized, such as oilseeds, pulses, bajra and maize. For instance, wheat yield ranges from a low of 3,591 kg per hectare in Hoshiarpur district to a high of nearly 5,148 kg per hectare in Fatehgarh Sahib district. Similarly, rice yield varies from around 2,831 kg per hectare in Gurdaspur district to a high of nearly 3,679 kg per hectare in Fatehgarh Sahib district. In the cotton-growing districts, yield has been fluctuating in a narrow range around an average of 340 kg per hectare. However, the yield of oilseeds, cultivation of which has now been marginalized in the state, has recorded wide variations, from as low as 738 kg per hectare in Gurdaspur district to as high as 1,388 kg per hectare in Fatehgarh Sahib. Similarly yield level of pulses, bajra and maize crops, which too have been marginalized in the state, have recorded wide inter-district variations. Thus we find that the cropping pattern in the state has got confined to those crops which have lower variability in yields and fetch relatively better prices so that farmers have more or less assured returns from these crops. Any effort to diversify state's agricultural economy will bear results only if the alternative crops being suggested have stable yields and more remunerative prices so that farmers have better and assured returns from the alternative cropping patterns being suggested by the agricultural scientists. Mere lecturing to the farmers is unlikely to have any impact on them and their decisions will be dictated by economic considerations.

Implications of Wheat-Rice Rotation

In the initial stage, green revolution in Punjab was confined to wheat only because traditionally Punjab has never been a rice growing area. But after a few years, new varieties of rice also became popular with the farmers. Given the superior yields of wheat and paddy compared to the competing crops and given the input/output price structure, wheat and rice started replacing other crops in a massive way and presently wheat and rice account for nearly three fourth of the total cropped area of the state. Data for the reorganized Punjab are available since 1960-61 onwards. Between 1960-61 and 2001-02 Punjab agriculture has grown at a rate of nearly four and a half per cent (4.48 per cent) per annum. But production of wheat and rice has been growing at a much faster rate.

Table 6: Growth of Wheat and Rice in Punjab

Year	Wheat		Rice	
	Area (000) hec	Production (000) tons	Area (000) hec	Production (000) tons
1960-61	1400	1742	227	229
1970-71	2299	5145	390	688

1980-81	2812	7677	1183	3233
1990-91	3273	12159	2015	6506
2001-02	3420	15499	2487	8816
Growth Rate				
1970- 71 over 1960-61	5.08	11.43	5.55	11.62
1980-81 over 1970-71	2.03	4.08	11.73	16.73
1990-91 over 1980-81	1.52	4.70	5.47	7.24
2001-02 over 1990-91	0.45	2.23	2.12	2.80
2001-02 over 1960-61	2.20	5.47	6.01	9.31

Source: Statistical Abstract of Punjab for Various Years.

However, when we have a close look at Table 6, we find that momentum of growth in Punjab agriculture had petered out by 1990 and during 1990s the performance of not only the agricultural sector as a whole but even of wheat and rice has been rather dismal. During the 1990s Punjab agriculture grew at a rate of 2.38 per cent per annum only. In fact, between 1993-94 and 2000-01, Punjab agriculture has recorded a rate of growth of only 2.19 per cent per annum, which is more than half a per cent lower than the growth rate recorded by this sector at the all India level during this period. Even in the case of wheat and rice, two major crops which together account for nearly 75 per cent gross cropped area of the state, one finds a definite slow down after 1990. During 1990s wheat production recorded a rate of growth of 2.23 per cent per annum whereas rice production grew at a rate of 2.80 per cent per annum. In the case of wheat, output growth in 1990s is mainly because of productivity increase as the area under wheat has almost reached a saturation point. There is some consolation that wheat yields are still rising though at a much slower pace compared to 1960s, 1970s and 1980s. In the case of rice, however, out of 2.80 per cent growth in production achieved during 1990s, 2.12 per cent is attributable to area increase and only 0.68 per cent is the result of productivity increase. In fact the peak yield of 3510 kg (rice) per hectare was achieved way back in 1989-90 and this peak has never been crossed throughout the 1990s. Thus rice yields have almost totally stagnated.

It is not merely deceleration in the agriculture's rate of growth which is disturbing, but even more important is the fact that wheat area monoculture has seriously affected Punjab agriculture's capacity to absorb labour over time. The employment elasticity with respect to aggregate agricultural output in Punjab has already turned negative. An idea of the magnitude of this phenomenon can be had from the man hours used per hectare in the case of these two major crops. For example, in the case of wheat, per hectare use of labour was 680.27 man-hours per

hectare in 1975-76. Thereafter it started declining almost continuously and finally stood at 301.15 man-hours per hectare in 1999-2000. Similarly, in the case of paddy the labour use per hectare was 961.44 man-hours in 1974-75, the first year for which cost of cultivation data are available for paddy in Punjab. In 1998-99, the last year for which cost of cultivation data are available, it stood at 450.54 man hours/hectare. Thus we find that the man-hours used per hectare in the case of wheat in 1999-2000 were less than half of what it was in 1975-76. Similarly in the case of paddy the labour use per hectare figure in 1998-99 is less than half of what it was in 1974-75 (Cost of Cultivation of Principal Crops in India, 2000). No wonder then that the proportion of workers engaged in agriculture (cultivators and agricultural labourers) in Punjab came down drastically from 55.26 per cent of the labour force in 1991 to 39.4 per cent in 2001 (Census of India, 2001). Whether Punjab's small and medium scale industries will be able to absorb this massive shift of labour force, which has gone away from agriculture, is doubtful. Already there is a huge army of unemployed in the state and most of them are educated unemployed. The fourth Economic Census carried out by the Economic and Statistical Organisation of Punjab in April-June 1998 covering all villages, towns and cities of the state put the figure of unemployed persons in the state at 1,471,527 out of which 897,860 (61 per cent) were educated. Currently this figure is estimated to be in the region of 18-20 lakhs. A situation in which nearly 20 per cent labour force is unemployed (most of them being educated ones) in a state which passed through a decade long phase of militancy, is certainly a cause for concern.

There is a large-scale use of farm machinery in Punjab. Right now the state has 4.35 lakh tractors, 1.45 lakh seed drills, 5.40 lakh sprayers, 3.25 lakh threshers, 7,300 combine harvesters and 9.5 lakh tubewells (Statistical Abstract of Punjab, 2002). If we also take into account other small implements required in agricultural operations, the total present value of capital investments in farm machinery alone is estimated to be approximately Rs. 8,000 crores. These capital assets were created keeping in view the requirements of the existing cropping pattern in the state. This capital stock is not that malleable as to suit any other cropping pattern which is be attempted through diversification. Thus, any attempt at diversification of the state's agricultural economy away from the existing wheat-rice dominated cropping pattern would also require corresponding changes in the structure and composition of capital assets which would require additional investment of a couple of thousands of crores. But this is only one part of the story and a small one. Much more serious problem is posed by the falling water table in the state and its potential consequences. Already 90 Development Blocks of the state out of a total of 138 blocks have been declared 'black', meaning that in these blocks water table has gone down to a dangerously low level and the drawing of water is more than the recharge (Sidhu and Dhillon, 1997). Shallow tubewells are unable to draw water and farmers have to occasionally resort to deepening their tubewell bore and/or place the electric motor at a lower place like a pit. For this they incur extra costs. A study by the Punjab Agricultural University shows that the cost of deepening the tubewells has on average increased from Rs. 4,219 per deepened tubewell (or Rs. 177 per tubewell) prior to 1990 to Rs. 6,201 (Rs. 492) during 1991-95 and to Rs. 8,184 (Rs. 2046) during 1995-99. These costs are at 1999 prices. This means that every year

farmers in Punjab are spending roughly Rs. 200 crores on deepening their tubewells (Singh and Kalra, 2002). Further, some well off farmers in these 'problematic' areas have started shifting to submersible tubewells. A submersible tubewell costs anything between Rs. 70,000 to Rs. 150,000 depending upon the depth of water table and the size of the bore. Once a farmer has installed a submersible pump, it creates problems for the neighbouring farmers as their shallow tubewells capacity to draw water is seriously affected. This starts a chain reaction. Even if we assume Rs. 1 lakh as the average cost of a submersible pump and if in due course of time even one-half of the tubewells in the state are converted into submersibles, it would require a staggering Rs. 5,000 crores of additional investments thereby further worsening the problem of indebtedness.

But much more serious than the immediate investment requirements of shifting over to submersible pumps will be the long term socio-economic consequences of this problem. In Punjab, 26.50 per cent of the farmers have a holding of less than one hectare each. Another 18.26 per cent have between 1 and 2 hectares. Considered together nearly 45 per cent farmers are small and/or marginal farmers with a holding below 2 hectares. A small or marginal farmer would not be in a position to mobilize resources for a submersible pump. With well-off farmers shifting over to submersible pumps, small and marginal farmers will be effectively disfranchised from their right to underground water which is a community resource. The loss of the most reliable irrigation source will affect their livelihood, land values and may even lead to their alienation from land for they will either have to sell their land or stop farming. This development is causing deep concern to small and marginal farmers and is adding to social unrest in rural Punjab.

Pattern of Tenancy in Post-Green Revolution Punjab

Tenancy, particularly of the share cropping variety, has been in existence in India since ancient times. Even Kautalya's *Arthasastra,* a fourth century B.C. manual about state policy and management, refers to a system under which 'lands were assigned on half share generally to those who had nothing else to supply but their bodily labour'. This system existed with wide spatial and temporal variations across the country. Its extent, form and content have been changing with time and pace of development. Under the British rule about three-fifth of the cultivated area of Punjab was under tenancy. However, there was relatively higher concentration of tenants in the canal colonies which after the partition became part of Pakistan. But even in the Indian Punjab in 1947, 48.6 per cent of the total cultivated area was under tenancy cultivation (Chadha, 1986). The main suppliers of land in the lease market in Punjab were big land owners. A survey of land holdings conducted during 1920s reveals that in the above 50 acre category, there were around 121 thousand owners but only 20 thousand operators. Thus more than one lakh owners (83 percent) were renting out a part or whole of their land. Tenants were generally either landless or small owners who were leasing in land to provide gainful employment to their family labour. After the enactment of Tenancy Legislation in 1953, providing security to tenants-at-will, area recorded under tenancy cultivation in 1957 decreased to 33.56 percent. According to NSS data for 1961-62 area under tenancy

in Punjab was 35 percent. In fact, however, tenancy legislation had driven the tenancy underground and promoted the unrecorded oral lease arrangement and the NSS data (26th Round) shows that in 1971-72 the percentage of operated area leased in to total operated area was only 26 per cent (Singh, 1985). The most affected were landless tenants as purely rented holdings decreased from 22 per cent of all operational holdings in 1953-54 to around 4 per cent in 1971-72. A large majority of them joined the ranks of agricultural labourers. Consequently the proportion of agricultural labourers to total agricultural workers increased from 12 per cent in 1951 to around 32 per cent in 1971 and further to 40 per cent in 2001.

With the introduction of high yielding varieties in the late 1960s and large-scale mechanization of farm operations, Punjab agriculture has been totally transformed. A technological transformation of this magnitude is bound to have a profound impact on agrarian relations. Share cropping has given way to fixed rent tenancy. Compositions of tenants have also undergone a sea change from landless poor farmers to relatively better off entrepreneurial land owning tenants. Some of the large farmers are also leasing in land to optimally utilize their capital assets. Already there is evidence in empirical literatures to the emergence of such entrepreneurial tenants, (Bharadwaj and Das, 1975; Singh, 1989). With the development of capitalism in agriculture, the value system of society is also undergoing change. Family prestige is getting associated with income and wealth rather than leisure and withdrawal from work. Consequently the main group of lessors are not leisure preferring big landowners but those landowners who are engaged elsewhere and hence are unable to spare sufficient time to supervise cultivation with hired labour. Under these circumstances it should not be their unwillingness but inability to supervise cultivation with work that is likely to be the determining factor in choosing the contract. In the following paragraphs we shall verify the hypotheses set out above on the basis of *a-priori* expectations and casual empiricism. The results are based on a recently conducted primary survey of 90 households engaged in tenancy in three villages, one each from Amritsar, Jalandhar and Moga districts of Punjab. The entire area under tenancy in these three villages was recorded and all the tenants were surveyed. Survey was conducted in October 2003. In fact it is a census of tenants in these three villages.

The total cultivated area in these surveyed villages was 3824 acres. Out of these, 878 acres is under tenancy. Thus 22.96 per cent of the total cultivated areas is under tenancy. The entire area is irrigated. It has canal water as well as tubewell irrigation facility. Tenants belonged to all age groups; the youngest one being 23 years old and the oldest one is 65 years old. Four tenants (4.4 per cent) are in their 20s, 13 (14.4 per cent) in their 30s, 30 (33.33 per cent) in their 40s, 26 (28.88 per cent) are in their 50s and the rest 17 (18.8 per cent) are above 60 years of age. In term of education 14 (15.87 per cent) of them are illiterate the rest are educated. In fact 46.6 per cent of them are Matric and above. Seventeen of them are graduates or above including four postgraduates. Caste-wise, a predominant majority of them 62 (69 per cent) are Jat Sikh 16 (17.7 per cent) Kamboj (a peasant caste), 7 (7.77 per cent), Harijans (Mazbhi Sikhs), 4 (4.4 per cent) Khatri/Aroras and the remaining 3 (3.3 per cent) Ramgharia Sikhs.

None of the 90 tenants in our sample is a landless tenant. All owned some land.

The smallest landholders 4 (4 per cent of them) owned one acre each. The biggest tenant in our sample owned 105 acres. He has leased in another 20 acres. He is a forty five years old Jat Sikh arts graduate, owns two tractors, 10 tubewells and the estimated present value of his machinery is Rs. 8.5 lakhs. Ownership holding size-wise, 6 (6.6 per cent) tenants in our sample are in the size group of below 2.5 acres, 14 (15.55 per cent) own between 2.5 to 4.99 acres, 26 (29.9 per cent) owned between 5-9.99 acres. The largest number, 31 (34.41 per cent) own between 10 and 19.99 acres and 13 (i.e. 14.44 per cent) are having land ownership above 20 acres each. In fact six of them own more than 35 acres each. Thus in our sample, nearly half the tenants (44 out of 90) are rich peasants owning more than ten acres each. On an average a tenant in our sample owns 12.84 acres of land. 77 out at 90 tenants in our sample own tractors. In fact nine of them have two tractors each. All but one of them have their own electric motors for operating tubewells. The average value at non-landed capital assets owned by a tenant in our sample works out to be Rs. 3.06 lakh.

There is a distinct preference on the part of lessors to lease out land to bigger and better off farmers because they can make better and timely payments of rent and give at least half the rent in advance. Sometimes the entire amount of rent is given in advance by these capitalist tenants. Thus, it is no longer possible and/or viable for a landless labourer or a marginal farmer to compete with large capitalist farmers for leasing in land. No wonder then that in our sample not even a single tenant is found to be a landless tenant or pure tenant. In fact no one would like to lease out his land to a landless tenant. Therefore, tenancy as a source of employment for self and family labour is no longer an option available to the landless workers and marginal farmers. This has serious implications for their employment opportunities within the agriculture sector.

As far as the area under tenancy is concerned, as already mentioned, the total area under tenancy with these 90 tenants in our sample is 878 acres. Thus, on average, each tenant has leased in approximately 9.75 acres. However 20 tenants have leased in less than five acres each. Forty tenants have leased in between 5 and 9.99 acres each. Another 16 of them have leased in between 10 and 20 acres each. Only 14 of them have leased in more than 20 acres each. As far as the percentage of area leased in is concerned, 38 acres (4.32 per cent) are leased in by marginal farmers owning less than 2.5 acres of land. Another 179 acres i.e. (20.38 per cent) have been leased in by small farmers owning between 2.5 and 4.99 acres. Altogether 217 acres (24.71 per cent) of the total leased in area are with tenants who own less than five acres of land. Another 143 acres i.e. 16.28 per cent of the area leased in are with those owning between 5 and 9.99 acres of land. Rest of the 518 acres under tenancy (i.e. 58.99 per cent) are leased in by those owning 10 acres or more. In fact 196 acres (i.e. 22.32 per cent) of the area under tenancy are with those owning more than 20 acres each. Thus we find that less than one-fourth of the total area under tenancy is with small and marginal farmers. The rest of the area is with relatively better off farmers. In fact nearly 60 percent of the area under tenancy is with the rich peasants owning more than ten acres of land.

We also inquired into who has leased out this land to these tenants. The 878 acres under tenancy covered by our sample have been leased out by 123 parties

including three panchayat landholdings. Altogether these 123 lessors own a total of 1170.5 acres of land out of which they have leased out 878 acres i.e. nearly 75 per cent. The average size of holding of lessors work out to be 9.51 acres compared to lease's average size of 12.84 acres. Thus the lessor in Punjab happens to be a smaller holder compared to the average tenant. Out of 123 lessors, 14 are marginal farmers owning less than two and a half acres. Forty-eight of them own between 2.5 to 4.99 acres of land. Another 34 own between 5 and 9.99 acres. Ten lessors have holding between 10 acres and 19.99 acres. The rest 17 are large land holders owning more than twenty acres of land each.

As far as the motive behind leasing in land is concerned only 8 tenants said they have leased in land to find gainful employment for self and family labour. Thirty-eight of them replied that they have leased in to make their land holdings viable and also use their capital assets optimally. Thirty of them have leased in to make optimal use of the capital assets which they have with them. Two of them said the land they have leased in was contagious to their plot of land and they did not want any inconvenient neighbour around. Five of them have leased in because the land belonged to their own relatives' brother and/or uncle and they did not want any outsider around. One tenant who happen to be a former Sarpanch but who lost the election this time has leased in panchayat land at an unusually high rate of rent simply to show to the other party that his writ still runs in the affairs of the village. But leaving these few cases of non-economic considerations apart, the most important reasons why they have leased in land is (a) to make their owned holding viable followed by (b) optimal use of machinery and capital assets, and (c) to have access to gainful employment for the family but this is the least important economic reason for hiring in land by the tenants in Punjab. We also inquired from lessors the reason why they have leased out their land. Out of a total of 123 lessors three are leasing common property i.e. panchayat lands and in any case these have to be leased out. Out of the remaining 120 individual lessors, an overwhelming majority i.e. 73 reported to be doing some full time job (in the army, police, education department, as agriculture inspector/officer, advocate etc.) and therefore they cannot cultivate their land themselves. Twenty lessors were involved in some other vocation such as dairying, poultry, *atta chaki*, commission agent, workshop, plumber, electrician, shop keeping etc. and were unable to spare time for cultivation. Ten families had gone abroad and their land is always leased out to somebody or the other, reliability of the person being a major consideration. Five of them reported to be too old or a widow and therefore cannot go for self cultivation. Another five of them have moved to the nearby town or city and are no longer interested in self cultivation. In one case the owner happened to be studying and has leased out his land. Only in four cases was it reported that since their size of holding was too small, it was not viable for them to go for self-cultivation. And only in the case of two lessors (both being large holders but opium addicts) leisure preference is the reason for leasing out land.

In all the 123 cases studied by us lease was on a yearly basis and in lieu of cash rent. But there is no formal written agreement between the parties except in the case of Panchayat lands where records have to be maintained. Usually half of the rent is paid in advance, sometimes 3-4 months in advance, from the date of taking actual

possession of land and the rest of the payment is made after six months of the taking over of actual possession or after the *kharif* crop is sold, whichever is earlier. Earlier possession of leased lands was given to the tenants around 15th of June. Now, with new agricultural technology and advent of early maturing varieties, the timing of handing over or taking over has advanced somewhat and normally the possession of leased land is handed or taken over around 15th of May every year. The rent per acre of land in our sample varies from Rs. 7,000 to Rs. 14,500 depending on the productivity of land, cropping pattern, location of land, source of irrigation, relative demand-supply position, whether access is through a metalled road and reliability of the tenant etc. The average rent per acre in our sample works out to be Rs. 11,075.

To sum up, our study shows that in Punjab about 23 per cent of the total cultivated area is still under tenancy. Tenancy has become a fixed cash rent tenancy. Tenants are no longer landless or small owners. In fact, nearly two third of the total area under tenancy is leased in by farmers owning more than ten acres of land. The motive for tenants to lease in land is either to make their owned holding more viable or to optimally utilize the capital assets. In fact none of the tenants is a landless tenant. There is a distinct preference on the part of lessors to lease out land to bigger farmers. Tenancy as a source of employment for self and family labour is no longer an option available to the landless workers and marginal peasants. On average, a tenant owns nearly thirteen acres of land. Eighty five per cent of the tenants own tractors. Nearly all of them have their own tubewells. An average tenant owns capital assets worth Rs. 3 lakhs. In fact the lessor in Punjab is a relatively smaller land holder compared to the lessee. Thus most of the lessors are not leisure preferring big landlords but middle peasants or small holders who are gainfully engaged elsewhere and are not in a position to cultivate their land themselves. It is a predominantly capitalist agriculture dictated by economic considerations, with fine regard for marginal costs and returns.

Condition of Agricultural Labour

There has been a steep rise in the proportion of agricultural labourers to total agricultural workers in Punjab up till 1991. This proportion has remained stagnant between 1991 and 2001. In 1951 their proportion in agricultural workers was just around 12 percent. It rose to 32 per cent in 1971 and further to 41.5 per cent in 1991. Census 2001 puts this figure at 41.2 percent. It appears both demand and supply factors have been responsible for this rise. Initially after independence their supply increased as a large number of tenants-at-will who were evicted from land joined the ranks of agricultural labourers. Simultaneously, however, demand for agricultural labourers grew because landlords who resumed self-cultivation in the wake of enactment of tenancy legislation started cultivating with the help of hired labourers. This led to a fast increase in the proportion of agricultural labourers in total agricultural workers. Later on, factors such as growth of irrigation, increasing cropping intensity with the introduction of short duration varieties, changes in cropping pattern towards more labour intensive crops such as paddy and increasing volume of output all led to the increase in demand for hired labourers. In the initial years of green revolution, at least till the early 1970s, increased demand for

agricultural labourers also resulted in the increase in real wages. Until then the intensity of mechanization was still at a moderate level.

After mid 1970s as the pace of mechanization picked up, the use of labour per hectare started declining in the case of both the major crops i.e. wheat and paddy. In the case of wheat, it came down from 680.23 man-hours per hectare in 1975-76 to 301.15 man-hours per hectare in 1999-2000. Similarly in the case of paddy it came down from 961.44 man-hours per hectare in 1974-75 to 450.54 man-hours per hectare in 1998-99 (GOI, 2000). This along with large influx of agricultural labourers from other states during peak seasons started exerting downward pressure on wages of agricultural labourers. It is not surprising therefore that some studies have shown a slight fall in the real wages in the latter half of 1970s and early 1980s compared with 1970-71 (Chadha, 1986; Jose, 1988). Almost all agricultural labourers in Punjab belong to lower strata in terms of caste and class hierarchy. More than 90 per cent of them are from landless households belonging to scheduled caste families. The rest are from other backward castes. To examine the socio-economic conditions of agricultural labour we surveyed 75 agricultural labour households from three clusters of three villages, one each from Amritsar, Jalandhar and Moga districts of Punjab. The main conclusions that can be drawn on the basis of this primary survey are summarized below.

There are two types of contracts between landlords and agricultural labour. One is yearly contract for attached labourers and the other category consists of casual labourers. Attached labourers are usually employed on a yearly basis and are paid in cash but the employer also provides them with tea twice or thrice a day and two meals a day. The amount of contract varies from Rs. 18,000 to Rs. 22,000 per annum depending on the labourer's age, health and demand and supply conditions in the village. The average cash wage of an attached labourer in our sample works out to be Rs. 20,000 per annum. Perquisites in the form of tea and meals have been evaluated at approximately Rs. 12 per person per day. Normally an attached labourer is given 15 days off in a year but these are allowed only in the off seasons. However if an attached labourer abstains from work during busy seasons or beyond the 15 days allowed to him, deductions from his salary are made at a penal rate which varies from area to area. In our sample this penal deduction rate works out to be Rs. 125 per day. On average, in our sample, an attached labourer remains absent for 20 days in a year for which he receives salary deduction at the rate of Rs. 125 per day. Thus the effective cash wage which an attached labourer in our sample gets in a year is Rs. 17,500 instead of Rs. 20,000 mentioned earlier. Thus the effective wage rate for 330 days he actually works is Rs. 53 in cash and Rs. 12 as perquisites i.e. Rs. 65 per day or Rs. 21,450 in a year.

On the other hand, a casual labourer as per our survey, gets work for 140 days in a year. Out of these 140 days, around 70 days work is in the peak seasons when the average cash wage is Rs. 90 per day. He is also given tea at least thrice a day and two meals, which have been evaluated at Rs. 15 per day. Thus for 70 days his average wage is Rs. 105 per day. For the remaining 70 days the average wage works out to be Rs. 80 in cash plus tea and meals valued at Rs. 12 per day or a total of Rs. 92 per day. The weighted average wage of a male casual worker works out to be Rs. 98.50 per day. Thus the average daily wage of a male casual worker works out to be

nearly 37 per cent higher than the average daily wage of an attached labourer. However, because of the fewer number of days for which he gets work, his annual income works out to be only Rs. 13,790, which is roughly 35 per cent lower than the average annual earnings of an attached labourer. But then he enjoys far greater leisure and flexibility in timings. Even otherwise the drudgery of work of an attached labourer is far greater compared to that of a casual labourer - normally he reports to the employer for work quite early in the morning and leaves for his home quite late in the evening. He remains at work approximately for 12-14 hours a day depending on the season. The only advantage he has is that he gets at least half the annual wage in advance and the rest he receives as per his day to day requirements or whenever he needs it.

A female casual labourer on the other hand gets paid work in the fields for about 70 days in a year during peak seasons. During these 70 days she gets a daily wage of Rs. 60 in cash and tea and two meals valued at Rs. 10 a day. For the remaining nine months or so she earns on an average Rs. 20-22 per day by working for rich farmers, washing their clothes, sweeping their courtyards and carrying cow dung to the pits on the periphery of the village. Thus, with all her efforts she manages to earn approximately Rs. 10,000 in a year in cash and kind. Our study shows that an average casual agricultural labourer family with both husband and wife working, manages to earn Rs. 24,000 in a year which is less than what a farmers earns from one acre of self cultivated owned land or what a pure tenant earns from two acres of land taken on lease. However, it must be born in mind that even the ownership of one acre of land gives lot of economic security as well as social prestige to the small peasant which is not there in the case of landless workers. Thus, this comparison in terms of annual income between landless labourer and a peasant who cultivates one acre of land or a tenant cultivating two acres of land is only notional and not real.

Conclusions

Punjab is a small state with only 1.53 per cent of country's geographical area but it is producing 22.6 per cent of wheat, 10.8 per cent of rice and 12.9 per cent of the total food grains in the country. Food grain production in the state jumped from around 3 million tonnes in 1960-61 to more than 25 million tonnes by 2000-01. Agricultural production during these four decades grew at a rate of around four and a half per cent per annum. Production of wheat and rice has been growing at an even faster rate. In the process the state's agricultural economy has become a wheat-rice dominated one to the exclusion of other crops. But the momentum of growth has petered out and during the decade of 1990s agricultural production in Punjab has been growing at a slower pace compared to the growth of this sector at the all India level. Our study shows that rice yields have totally stagnated. Although wheat yield is still rising it is at a much slower rate. In the mean time the food scenario at the national level has changed almost completely. From the food shortages of early 1960s the country is having burgeoning surpluses in food grains. In this situation the state is finding it difficult to sell its wheat and rice.

Our study shows that farmers in Punjab have not been given a due share out of increased productivity. In fact, a major share of the increased productivity has been

siphoned off by the state through the mechanism of administered prices. Till mid 1980s farmers' incomes were rising despite the fact that per hectare returns from wheat and paddy were stagnant primarily because they were shifting over area from less remunerative crops like gram, pulses, maize, coarse grains and oilseeds to more remunerative and steady crops such as wheat and paddy. Intensity of cropping was also going up. Since the area under wheat and paddy cultivation as well as the intensity of cropping, have reached saturation levels, farmers' incomes from per unit of area have almost totally stagnated. In the meantime, average size of holding is going down. Consequently their real incomes have in fact been falling since the mid 1980.

Furthermore, excessive dependence on wheat and rice cultivation has created several problems for the state. Growing the same crops over and over again has led to sharp deterioration in the productivity of soil. Now higher doses of chemical fertilizers have to be applied to achieve the same level of output. This is leading to a rise in the cost of production. Early plantation of rice is leading to depletion of underground water. The water table in Punjab is going down at the rate of 30cm annually. Ninety development blocks have already been declared 'black'. Shallow tubewells are not able to draw out water in many areas. Any shift over to submersible tubewells, apart from the huge costs involved, is likely to have dangerous socio-economic consequences as small and marginal farmers will have been effectively disfranchised from their right to underground water which is a community resource.

Agriculture in Punjab is not in a position to absorb any more additional labour force. In fact, the per hectare use of labour in the case of both the major crops i.e. wheat and paddy, has come down to less than half the level of the mid 1970s. There is a huge army of unemployed youth, most of them educated ones. Whether the state's medium and small-scale industry is capable of absorbing at least some of them appears doubtful. The general feeling is that the Central Government must help the state in a 'Crop Adjustment Programme' in the wake of the changed food scenario at the national level. That help does not appear to be forthcoming. Hence the resentment against the Central Government and there is a feeling of being let down after use.

Tenancy in Punjab has undergone a radical change. It is no longer the landless and small owners who are leasing in land on a share cropping basis to provide gainful employment to family labour. Tenancy has become a fixed cash rent tenancy. Tenants, in fact, are rich farmers who own tractors, tubewells and other farm machinery. They are leasing in land to make their holdings more viable and make a more optimal use their capital assets. Our study shows that none of the tenants in Punjab is a landless tenant. In fact, the average size of holding of tenants is larger than the average size of holdings of those who have leased out land. The lessors are not leisure preferring big landlords but middle class landowners who are gainfully engaged elsewhere and are not in a position to supervise cultivation themselves. Average cash rent is around Rs. 11,000 per acre but it varies from area to area. Although official records show a very small percentage of area under tenancy, our survey shows that around 23 of the total cultivated area is still under tenancy and it does not always enter the revenue records because most of the

contracts are oral contracts. Tenancy in Punjab is like any other activity in a capitalist economy dictated by economic considerations with fine regard for marginal costs and returns. But at least one thing is clear. Lessors in Punjab have a distinct preference to lease out land to bigger and. better off farmers. Consequently, tenancy as a source of employment for self and family labour is no longer an option available to the landless workers and small peasants as it used to be in the past.

Agricultural labourers in Punjab which constitute around two-fifth of the total agricultural workers mostly belong to scheduled castes and other backward castes. Some of them work as attached labourers on a yearly contract basis but most of them are working as casual labourer on a daily basis. During certain agricultural operations such as paddy transplantation, wheat and paddy harvesting and cotton picking, they also work on piece rate basis. This way they can engage their entire family labour and perhaps can also earn more. Attached labourers on an average get Rs. 53 in cash and two meals and tea from the employer. His total cash earnings work out to be approximately Rs. 17,500 per year. If however we also take into account his perquisites he earns approximately Rs. 65 per day for 330 days in a year i.e. Rs. 21450 per annum.

An average male causal labourer on the other hand gets work for 140 days in a year and receives a wage of Rs. 98.5 per day including perquisites i.e., tea and meals. Thus the average daily wage of a male causal worker is roughly 37 per cent more than the average daily wage of a worker employed on yearly basis. But the total yearly earnings of a causal worker (Rs. 14,000 approx) are about 35 per cent lower than the yearly earnings of an attached labourer. A causal female worker in Punjab gets wage paid work for about 70 days in a years at a daily wage of Rs. 70 (Rs. 60 + 10 as perquisites). If her earnings from work during the rest of the year are also taken into account she earns around Rs. 10,000 in a year. An average casual labouring family in Punjab earns Rs. 24,000 per year which is roughly equivalent to the earnings of an owner cultivator cultivating one acre of land or a pure tenant cultivating two acres of rented-in land.

Different sections of the peasants in Punjab have responded to the agrarian crisis in different ways. A small section of the peasants who were under heavy debt and distressed resorted to consumption of liquor and narcotics which further deepens the crisis and leads to family discord. Hundreds of distressed farmers committed suicides during the last decade or so. But a large majority of them are now in the process of organizing themselves under various banners and are getting ready to fight back politically for their just demands and negotiate a better deal. A large section of the Punjab peasantry is now convinced that they are being ill treated because they are not organized. They wonder how the Indian government can spend several thousand crores on a package to bailout Unit Trust of India to protect 20 million urban middle class investors but it has no funds to waive off the loans of poor farmers. The threat of withdrawal of the state from food grains trading is sending shivers down the spine of Punjab farmers because they know that given the financial condition of the state it would not be possible for the state government to handle this task.

Even the state government has given sales tax and other exemptions worth several thousand crores of rupees to industry in the state but has withdrawn the

benefits of free power to Punjab farmers on the pretext that Punjab State Electricity Board is on the verge of bankruptcy. While nobody would argue in favour of providing free electricity to the rural rich but the subsidies given to the urban rich also cannot be justified on any grounds of equity and social justice. Hordes of unemployed youth are roaming around looking for jobs which are scarce and generally bagged by the highest bidders. There is an atmosphere around of despondency in rural Punjab. The situation is alarming and calls for introspection on the part of powers that be.

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