Global Journal of Science Frontier Research: D
Agriculture and Veterinary
Volume 18 Issue 6 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Indebtedness Leading Punjab Farmers in to a DeathTrap: A Loan Waiver Needed

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Abstract- This study details the causes as to how and why Punjab farmers fell into a never -ending cycle of debt which started right from the British Era but became graver with time. Slowly, it turned the state into a graveyard of farmers. The reasons for this poor plight of Punjab farmers are many which can be attributed to the various Governments both at the State and the Center, peasants themselves and to agricultural economists. The loss of resources due to trifurcation of Punjab (1st November, 1966) , the uncertain political atmosphere during the period of militancy, the absence of democratically elected state government for about a decade (3510 days) and bypassing of primary (agriculture) sector during Economic Liberalization period (initiated in June,1991) made Punjab an 'Orphan' state. The farmers failed to diversify as no right advice was forthcoming from the economists and continued with wheat and rice combination for which there were no takers of their surplus produce after some years. A Continual increase in the cost of agricultural inputs relative to a minimal increase in the MSP of the crops by the Centre, the pest attacks (whitefly on cotton), depleting underground water level in 80% area and excessive use of fertilizers and pesticides reduced the quality of both the soil and water of the state.

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GJSFR-D Classification: FOR Code: 070199

Strictly as per the compliance and regulations of:

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Keywords: indebtedness, fragmentation, holding, mono-crop, depleting water level, fertilizers, green revolution, economic liberalization, cropping diversification, cropping intensity, contract farming, loan waiver, MSP.

I. Introduction

Punjab, where agriculture is a way of life with about 75% of the population, constitutes 5036 thousand hectares of a geographical area of which 4145 thousand hectares comprises of the 6th most fertile soil of the world to make 82% of its land under cultivation in 2013-14[1] .As the farmers have sown 3703 thousand hectare area more than once, the total cropped area in 2013-14 was 7848 thousand hectare (3703.2+4145-3703) or 7848000.2.47105=193928004 acres. The irrigation facilities provided with the help of over 14 lakh tube-wells and five canals (Upper Bari Doab canal, Sirhind canal, Bhakra canal, Bist Doab canal, Indira Gandhi canal), an abundance of dedicated labor and great inherited agricultural skills of Punjab farmers have made it possible.

Since the advent of 'Green Revolution,' the state has made rapid progress in agricultural production having the highest annual rate of increase in the whole of India as indicated in Table: 1.

State	% Growth Rate
Punjab	6.4
Haryana	4.7
Gujarat	3.4
Uttar Pradesh	3.2
Rajasthan	2.4
Assam	2.3
West Bengal	2.2
Karnataka	2.1
Andhra Pradesh	2.0
Orissa	2.0
Madhya Pradesh	1.8
Maharashtra	1.7
Bihar	1.6
Tamil Naidu	1.0
Kerala	1.0
All India	2.6

Source: Nirvikar Singh & Deepali Singhal Kohli: The Green Revolution in Punjab, India: The Economics of Technological Change (1997)

The cropping intensity has increased from 126% to 189% in 2013-14[2].The area under wheat increased by 250.0%(1400000 hectares to 3500000 hectares) and production by 939.15% (1742000 ton to 16360000 ton) while the yield increased by377.8% (1244 kg/ hectare to 4700 kg/hectare) during 1960-61 to 2016-17.The area under rice has increased by 1437.44%(227000 hectares to 30360000 hectares); the production by 5503.93 (229000 ton to 12604000 ton) and the yield by 410.11% (1009 k gm/ hectare to 4138 k gm/ hectare) during the period 1965-66 to 2004-05. During the same duration, the Area, Average Yield, and Production of cotton are as under:

446000 hectare to 227000 hectare; 269 k gm/ hectare to 756 k gm/ hectare; 705000 bales to 1142000 bales [3]. The state has played a prominent role by achieving self sufficiency in food grains by contributing 43% wheat and 23% rice and 12% of the total food grains though Punjab has less than 2% of the total land of India(*www: Punjab data. com*) to the central pool. So,

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it is rightly called '*India's grain bowl'*. This has become possible by implementing various state & centrally sponsored schemes by various sections of Agriculture department.

The farmers promoted Zero-tillage technology for wheat. They cultivated an area of 3.14 lakh hectares during 2004-05 by this technique to save Rs. 42 crores [4].

II. Methodoly

The research material was collected both from the official and non-official agencies, An analytical approach was taken into consideration while using primary and secondary sources. The primary sources are available at National Archives of India, Delhi, Punjab State Archives, Chandigarh and Dwarka Das Library, Chandigarh. Among the many official documents some like Proceedings of the Government of India and Punjab (Political, Finance, and Agriculture Departments) were scanned. We collected bulk of the data from the Department of Agriculture, Government of Punjab (www.agripb.gov.in), Statistical Abstracts and Agricultural Census of Punjab, Fortnightly reports, Reports on the progress of education, Reports on the Progress of Industry, Reports of the Department of Finance and Agriculture, ENVIS Centre: Punjab: Status of Environment & Related Issues, Punjab Government Gazetteers and Punjab Agro Food grains Corporation. Also, data from the Department of Economics & Sociology, Department of Soil and Water Engineering, P.A.U., Ludhiana were helpful. The secondary sources like the relevant Journals, Newspapers, Magazines, Articles, Various Books and Unpublished Theses were assessed rigorously and thoroughly with an aim to present an objective and up-dated work as far as possible. Full forms of Acronyms used in this article are given in the Table: 2.

Table 2: List of Acronyms

Acronyms	Full Form
Jowar	Sorgum
Bajra	Pearl Millet
Ragi	Finger Millet
Arhar Dal	Split Red Gram
Urad Dal	Split Black Gram
Moong Dal	Split Green Gram
Toria	Short Duration Variety of Brassica Campestris
ENVIS	Environment Information System
HYV	High Yielding Varity
M.T.	Metric Ton(1000Kilogram)
Qtl	Quintal
Hectare	2.47105381 ≈ 2.50 Acres
CGWB	Central Ground Water Board
Majha	Amritsar, Tarn Tarn, Gurdaspur and Pathankot districts of Punjab
Malwa	Firozepur, Faridkot, Fazilka, Shri Mukatsar Sahib, Moga, Bathinda, Ludhiana, Barnala, Mansa, Sangrur, Patiala, Ropar, Mohali and F. G. Sahib
Doaba	Hoshiarpur, Kaputhala, Jalandhar and Shaheed Bhagat Singh Nagar districts
PDS	Public Distribution System
CAGR	Compound Annual Growth Rate
CARG	Compound Annual Rate of Growth
NASA	National Aeronautics and Space Administration of US
CF	Contract Farming
PAFC	Punjab Agro Food grains Corporation
GSDP	Gross State Domestic Product
MSP	Minimum Support Price
CRISIL	Credit Rating Information Services of India
A_2+FL cost	Actual paid out cost plus imputed value of family labor

III. Discussion

No doubt, in the agricultural economy of Punjab, the problem of indebtedness among peasants had been in existence even before the British rule. However, with the British occupation of Punjab, this problem had assumed a new dimension and took the form of an acute problem. In the 19th century, some developments such as commercialization of agriculture, the secular trends towards the rise in the level of prices, the establishment of the right to the creditor to seize land in satisfaction of debt and widening of the scope of alienable land rights took place [5]. Along with these changes, the agriculturists were subjected to three- fold exploitation. They had to bear a heavy burden of *lagan*, interest, and taxes. In market too, they were squarely robbed.

There had been a continuous and rapid growth, both in the number of debtors and in the amount of their debt in Punjab. In 1921, the total debt of the Punjab

peasantry stood at Rs. 90 crores, while for entire British India, it was Rs. 600 crores [6]. By 1929, total debt for British India and Punjab was Rs. 900 crores and Rs. 135 crores respectively [7] and the consensus was that the volume of debt "has been increasing in the last century" [8].

In 1923, no less than 87% of the peasant proprietors were in debt to more than 40,000 money lenders[9].M.L. Darling (1925), who exhaustively dealt with the problem of indebtedness, concluded that:

The bulk of cultivators of Punjab is born in debt, live in debt and die in debt'[10]

But even after 70 years of independence, when farmers have hardly any issues with the burden of *lagan* and taxes, the condition and the living standard of the hardworking and resilient tiller of the soil are still pathetic. 85% farmers (both in the marginal and the large category) are under debt. A recent Punjabi University survey on the indebtedness among farmers and agricultural laborers [11] in rural Punjab has come out with the following data (Table: 3) for 2014-15.The banks advanced loans to the75.96 % of the farmers on 14% rate of interest. They used for it the following purposes (Table: 4):

Table 3: Debt on Punjab Farmers- A Glance

S. No.	Category	Debt(Rs)
1	Total Debt on the Farmers and Agricultural Laborers	69355Crore(693.55 billion)
2	Institutional Debt (banks, rural development banks)	56481Crore (564.81billion)
3	Moneylenders' Debt	12874Crore (128.74 billion)
4	Debt per house hold/ acre who own land	1,16,000
5	Debt per house hold / acre on each Agricultural Tiller	71203
6	Debt per house hold / acre on each Agricultural Labor	68,239

Table 4: Various Purposes for Taking Loans

Purpose	% of Total Loan
Farming	73.61
Health	1.68
Education	3.59
Social causes (Marriage)	6.85
Construction(Houses etc)	6.93

The Debt which in 2006-2007 was at Rs. 57,609 crores (Rs. 576.09 billion) swelled to 69355 crores (Rs 693.55 billion) in 2014-15.

Contrary to the belief that the exorbitant rate of interest charged by private moneylenders before India's partition was the main factor which had led to the debt on the farmers, the things, by and large, remain unchanged even though 82% of them have been advanced loans by some banks or the other government agencies while only 18% would fall prey to money-lenders with 14% and 24% interest per annum respectively. A majority of indebted farmer households belong to marginal (64%) and small (18%). The study, also, revealed that over 34% of marginal farmers and 20% small farmers (Table: 5) are living under the poverty line.

Table 5: Categories of Farmers with Average Holding

S. No.	Farmers' Category	Average Holding(Hectare)
1	Marginal	0.5-1.0
2	Small	1.0-2.0
3	Sem-Medium	2.0-4.0
4	Medium	4.0-10.0
5.	Large	Above 10.0

Farmers' suicide is not a new phenomenon in the state. Unable to pay the debt, Punjab is slowly turning into a graveyard of farmers. A study conducted by the three universities, Punjabi University Patiala, Guru Nanak Dev University, Amritsar and Punjab Agriculture University, Ludhiana, revealed that more than 10,000 farmers have committed suicides during the past 15 years of whom 4686 died during 2000-2011 by consuming poison while 2240 died due to other reasons, including drug addiction [11].A look at the profile of the farmers who committed suicide due to unseasonal rains reveals they are mostly marginal and small farmers, with land holdings up to five acres. They had taken additional land on lease at the rate of Rs.

30,000-40,000, a well-established practice in the Malwa region (Bathinda, Sangrur, and Mansa being the most affected districts) accounts for 70 to 80 % of farmer suicides. Unseasonal rains and hailstorms since mid-February, 2015, had severely damaged the 7 lakh hectares of Rabi crops (wheat, cereals, mustard, and potato) [12].

It needs a thorough study to understand as to why the Punjab farmers are still in the trap of the indebtedness even in as latest as per 2014-15 data.

a) Various Stumbling Blocks for Farmers

The cumulative effect of an innumerable number of factors made the farmers to fall prey to the eagle-eyed moneylenders *(Shahukars).* The various reasons which played a wicked role in the aggregation of the debt on farmers both in the pre- and post-independence of India are briefly explained as follows:

b) Fragmentation of Land and a General Decline in Average Holding

(a) Fragmentation means that even the small size of land owned by a farmer may not be held by him in one contiguous plot but are scattered in tiny bits all over the village [13]. This excessive sub-division prevented the cultivator from sinking capital in the land, even when the total holding would, otherwise, be large enough for profitable cultivation [14]. This acted as a deterrent to full utilization of land as to live with his family, in some measure of comfort, a farmer in Punjab requires eight to ten acres of irrigated land. The more the fertility, the more it was spilled as fertility and population go together. Further, the decay of handicrafts unaccompanied by the corresponding expansion of the large- scale industries, the dissolution of the joint-family system and the development of separatist tendencies (supported by laws of inheritance and succession) became the principal causes of the smallness of the average holding and its excessive fragmentation. So the average operating land base for all categories of farms except for the marginal ones declined (Table: 6).

Table 6: Average Operational Land holdings in 22 districts of Punjab

District	Average Operational Holding(Hectare)				
	1970-71	1980-81	1990-91	2000-01	2010-11
Amritsar	2.08	3.64	3.52	3.28	3.09
Bhatinda	4.79	5.53	4.80	4.87	4.81
Faridkot	3.67	4.60	4.83	4.17	3.79
F.G. Sahib	Was created On 13th, April,1992			4.03	3.90
Ferozpur	2.94	4.46	4,54	5.62	5.14
Gurdashpur	2.11	2.60	2.64	3.19	2.43
Hoshiarpur	1.65	2.69	2.64	2.58	2.73
Jalandhar	2.44	3.99	3.41	3.44	4.56
Kapurthala	2.49	4.19	3.63	3.50	3.67
Ludhiana	3.46	4.44	3.91	3.95	4.43
Mansa	Was created On 13th, April,1992			4.67	4.32
Moga	Was created On 24th, Nov.,1995			3.88	3.27
Mohali	-------Was created On 14th, April,2006 -------				2.99
Muktsar	Was created On 24th, Nov.,1995			7.22	6.86
Nawanshar	Was created On 7th Nov., 1995			3.05	3.04
Patiala	4.63	4.95	4.05	4.60	3.95
Ropar	1.84	2.61	2.09	2.35	1.97
Sangrur	4.16	5.13	4.49	4.52	3.45
Taran Taran	On Martyrdom day of Guru Arjan Dev- 2006				3.22
Barnala	------- Was created On 27th, July,2011--------				4.16
Pathankot	------Was created On 27th, July,2011 ---------				
Fazilka	----------Do ----------				
Punjab	3.02	4.07	3.79	3.78	3.15

Source: Statistical Abstract of Punjab & Agricultural Census of Punjab

(b) Among the bigger states, the % of wholly owned and self- operated operational holdings was lowest in Punjab in 1985-86(Table: 7).

Table 7: Land Ownership in 1985-86

State	% of Wholly owned/self-operated holdings
Punjab	84.9
Haryana	95.2
Gujarat	99.9
Uttar Pradesh	98.2
Rajasthan	98.2
Assam	89.9
West Bengal	88.5
Karnataka	99.8
Andhra Pradesh	99.5
Orissa	91.4
Madhya Pradesh	89.2
Maharashtra	98.3
Bihar	98.6
Tamil Naidu	99.4
Kerala	95.5
All India	95.9

Source: All India Report on Agriculture Census: 1985-86

These small holdings resulted in the multiplication of small fields involving a colossal waste of cultivable area because many more hedges, paths, etc. had to be laid down Again, scientific manuring and breeding of cattle were almost impossible and the margin of profit being small, complete ruin of the farmer was always susceptible if followed by a failure of the crops [15].Thus, the small size of holdings narrowed the margin of economic safety of the peasants.

c) Agricultural Land Values Appreciated

The sudden increase in the volume of the produce appreciated the value of agricultural land (from Rs. 41,675/hectare in 1985 to Rs. 3, 04,775/hectare in 1999) [16].Considering 2010 price index, this is equivalent to about Rs 12.9- 15.2 lakh/hectare [17] which made it an instant marketable entity and a source of profitable investment and credit for the landowners. This increase in the capacity to borrow led to the indebtedness increased the chances of the acquisition of land by moneyed classes [18]. In one of the reports, M.L. Darling records:

"Indebtedness seems due not to the impoverished condition of the people, but rather to the increased value of the land, which has given the zamindar [19] greater facilities for borrowing by improving the security, he has to offer"[20].

d) Social Ceremonies

The disturbing feature of indebtedness in India including Punjab was that the farmers would borrow for unproductive [6] causes. Such expenditures as those on marriages and other social ceremonies connected with birth, death, religious functions did not repay them. And since incomes of agriculturists, in general, were low, these provide no surplus for the return of these loans [21]. The lower strata of rural society had to suffer more as they could not even meet these minimum social obligations from their resources. So either they had to forgo their membership of the community or incurring a debt which might threaten their future viability [22].In short, the zamindars would not think of purchasing cattle, doing marriages or death ceremonies without borrowing money [23]. Prof. T. N. Carver, once, remarked [24]:

"Smallholdings, invariably, meant small incomes and in Punjab where expenditure was less determined by incomes than indicated by custom and necessity, small incomes sooner or later result in debt".

e) Excessive Love For litigation

'The people of the Punjab: says a report of 1925, 'are greatly addicted to litigation, and the litigation is of a more serious nature than in most other provinces' [25]. Temperament and ignorance alike made the peasant a firm believer in the efficacy of the direct method of settling the disputes which took the form of fatal fights and bloodshed. All of this led to litigation with all its consequences [26]. There was 2.3 crores pending cases, and 2.7 crores decided cases in the various courts of Punjab till 5th April 2016 when the e-courts Phase-I project culminated in the National Judicial Data Grid. The cost of obtaining justice in law courts of Punjab would amount to several thousand crores of rupees annually. Long drawn out litigation results in undesirable wastage of time and money, and adversely affected the agricultural operations. This litigation increased their expenditure, reduced their incomes and, thus, increased the need for loans [27].

f) Indebtedness of Farmers after Independence

In the fifties, there was enough of public investment in the Punjab state in dams, canals, electric power, rural roads and the towns which laid the foundation for the Green Revolution: an international movement launched in the 1960s to diminish world hunger which led to technological innovations. Developments in agriculture helped light manufacturing and services like tractors and pumps to a certain extent. Thankfully, the National Food Procurement policy reduced the market risks faced by farmers.

g) Mono-crop Culture and Saturation in Production Levels

Agriculture in Punjab suffers from 'Mono-crop Culture' of mainly wheat and paddy rotation. The high yielding varieties (HYVs) have replaced the multi-cropping pattern with the monoculture of wheat and rice resulting in exploitation of natural resources of the state especially water and soil, besides leading to loss of

floral biodiversity which has caused an emergence of new and uncontrollable weeds (Table:8). And to add to their misery is that the 'Production Levels' of these crops have, already, touched a saturation point. [12].

The Table: 8 shows that the area under these two crops has increased from 47.36 % in 1970-71 to 97.88% in 2015-16. Again, according to 2015-16 data, the total production of rice in India was 104408 thousand metric ton and that in Punjab was 11823 units. It means Punjab produced 11.32% of the rice produced in India. The production of wheat in India was 92287 units and the same in Punjab was 16077 units, which is 17.4% of the wheat production in India. The total production of cereals (includes wheat, rice and other cereals like maize, jowar, bajra, barley) in India was 251566 units, and that in Punjab was 28400 units. According to these figures, Punjab produced almost 11.3% of the total cereals produced in the country.

Table 8: Production (%) of Majority Crops

Year	Crops (%)	
	Rice	Wheat
1970-71	6.87	40.49
1980-81	17.49	41.58
1990-91	26.86	43.63
2000-01	32.89	42.92
2007-08	33.15	44.31
2008-09	34.57	44.57
2009-10	35.58	44.72
2010-11	35.85	44.53
2011-12	29.41	50.25
2012-13	32.34	47.17
2013-14	31.21	48.81
2014-15	33.31	45.16
2015-16	41.48	56.40
2016-17	40.93	57.12

Source: Department of Agriculture, Punjab

h) The Continual rise in fixed and variable input costs

Growing a combination of wheat and rice has caused deterioration in the quality of the soil which would result in a decline in productivity. So a higher dose of fertilizers was needed to obtain the same yield which would increase the cost of production per hectare.

There is a continual rise in fixed and variable input costs like fertilizers, pesticides and weedicides, quality seeds and diesel annually (Tables: 9-17).

Table 9: Total Consumption of NPK (M. T.) and Consumption per Hectare

Year	Nitrogen (N)	Phosphorus (P)	Potassium (K)	Total NPK	Consumption (Kg/hectare)
1960-61	5	---	----	5	----
1970-71	175	31	7	213	37.50
1980-81	526	207	29	762	112.50
1990-91	877	328	15	1220	162.60
1995-96	1020	227	16	1263	166.31
2000-01	1008	282	23	1313	168.33
2005-06	1255	369	63	1687	214.00
2006-07	1299	354	38	1691	215.00
2007-08	1317	341	37	1695	213.00
2008-09	1332	379	55	1766	233.00
2009-10	1348	383	56	1786	226.00
2010-11	1403	435	73	1911	243.00
2011-12	1416	449	53	1918	243.00
2012-13	1436	416	33	1885	239.00
2013-14	1425	469	83	1977	251.00
2014-15	1730	460	60	2250	247.00
2015-16	1510	452	78	2040	257.00
2016-17	1409	386	46	1791	232.00

Source: Agriculture at a Glance, Department of Agriculture, Punjab

Table 10: (a). Fertilizer Prices (Rs per M.T.) in Punjab

Period	Urea	DAP	SSP(P)	SSP(G)	NPK	MOP	NP
K-19.94	2760	7200	2260	2460	6940	3900	6600
R-1994-95	3320	7800	2480	2680	7540	3900	5960
K-1995	3320	9800	2600	2800	8940	4500	6000
R-1995-96	--do--	9575	--do--	--do--	--do--	--do--	--do--
K-1996	NA	NA	NA	NA	NA	NA	NA
Upto5.7.1996	--do--	--do--	--do--	--do--	--do--	--do--	--do--
6.7.96 to 8.9.96	--do--	7575	2440	2640	7415	4000	5231
From 9.9.1996	--do--	9100	2700	2900	7615	4500	6500
R- 1996-97	--do--	--do--	--do--	--do--	--do--	--do--	--do--
K-1997	3360	8300	2580	2780	7400	3700	--do--
R-1997-98	--do--	--do--	--do--	--do--	--do--	--do--	--do--
K- 1998	--do--	--do--	--do--	--do--	--do--	--do--	--do--
R-1998-99	--do--	--do--	--do--	--do--	--do--	--do--	--do--
K-1999	4000	8300	2550	--do--	--do--	--do--	--do--
R-1999-2000	--do--	--do--	--do--	--do--	--do--	--do--	--do--
K-2000-01	4600	8900	2680	2880	7960	4255	6880

Source: Department of Agriculture, Punjab; K= Kharif, R= Rabi; NA= Not available

Table 10: (b). Fertilizer* Prices in Punjab

Year	Name of Fertilizer(Rs. / Qtl)					
	Superphosphate	DAP	Urea (46%)	Muriate of Potash	Zinc sulphate	FYM
2007-08	370	935	478	445	2500	100
2008-09	--do--	--do--	--do--	--do--	--do-	-do-
2009-10	360	995	530	520	2500	100
2010-11	--	-do-	-do-	--do--	2800	--do--
2011-12	--	1820	540	1200	4000	120

Source: Department of Economics & Sociology, P. A. U., Ludhiana: New Fertilizers added

Table 11: Consumption of Insecticides and Pesticides

Year	Consumption(M.T.)
1980-81	3200
1990-91	6500
1995-96	7200
2000-01	6970
2005-06	5970
2006-07	5975
2007-08	5900
2008-09	5760
2009-10	5745
2010-11	5600
2011-12	5690
2012-13	5725
2013-14	5720
2014-15	5699
2015-16	5721
2016-17	5843
2017-18	6374

*Department of Agriculture, Punjab;*Technical grade*

Table 12: Prices (Rs.) of Insecticides, Weedicides and Fungicides

Name of Chemical	Year				
	2008	2009	2010	2011	2012
Weedicides					
Arelon (per 500 gm)	160	150	160	170	210
Leader (per 13 gm)	325	340	320	325	400
Topik (per 160 gm)	----	----	350	350	400
2,4 D (per 500 gm)	100	300	200	220	220
Atrazine (per 500 gm)	140	150	150	150	150
Butachlor (per Litre)	160	200	180	180	180
Insecticides					
Chlorpyriphos (per Litre)	180	250	220	220	250
Malathion 50EC(per Litre)	180	180	250	240	240
Rogor 30EC (per Litre)	230	240	350	290	300
Cofidor (per Litre)	1800	1500	1600	1800	1800
Thiodan 35 EC (per Litre)	260	250	250	260	260
Dithane M-45 (per 500 gm)	115	200	170	180	250
Indofil M-45 (per 500 gm)	130	145	170	180	250
Stomp (per Litre)	430	390	450	450	450
Fungicides					
Blitox (per kg)	200	200	250	280	360
Streptocycline (per 6 gm)	35	32	30	35	40
Emisan-6 (per 100 gm)	40	50	60	55	65

Source: Department of Economics & Sociology, P. A. U., Ludhiana

Table 13: Total Seed Requirement for Crops in Punjab

Crop	Seed Requirement/ hectare(Kg)	Total seed Requirement(Ton)*			
		2007-08	2008-09	2009-10	200-11
Wheat	100.0	348700.0	352600.0	352200.0	351000.0
Gram	40.0	80.0	120.0	120.0	120.0
Sarson	3.8	112.7	108.9	116.4	120.2
Sunflower	5.0	100.0	100.0	110.0	75.0
Paddy	20.0	52180.0	54700.0	56040.0	56520.0
Maize	20.0	3080.0	3020.0	2780.0	2660.0
Sugarcane	87.5	9450.0	7087.5	5250.0	6125.0
Cotton	1.5	906.3	789.4	765.5	723.5

**Calculated by multiplying/ hectare requirement of seed with an area under a specific crop*

Table 14: Seed Prices of Crops in Punjab

Crop	Price of Seed (Rs/ Kg)				
	2008	2009	2010	2011	2012
Wheat	16.25	17.50	17.50	20.00	--
Gram	50.00	50.00	50.00	50.00	
Sarson	46.67	46.67	66.67	66.67	---
Sunflower	200.00	200.00	200.00	200.00	--
Paddy	18.75	18.75	18.75	25.00	25.00
Maize	50.00	50.00	70.00	70.00	150.00
Sugarcane	1.75	1.75	1.80	2.50	2.75
Cotton	2000.00	2000.00	2000.00	2000.00	2000.00

Source: Department of Economics & Sociology, P. A. U., Ludhiana

Table 15: Number of Tractors and Tube Wells

Year	No of Tractors	Number of tractors/ 000' ha	No. of Tube wells*	Number of tube wells/ 000' ha
1970-71	5281	1.30	1.92	47.37
1980-81	118845	28.34	6.00	143.06
1990-91	289064	69.53	8.00	189.66
2000-01	434032	102.13	10.73	252.47
2007-08	485781	116.02	1246000	297.59
2008-09	492220	118.01	1276200	305.92
2009-10	498517	119.89	1375517	330.93
2010-11	504310	12129	13.81606	332.97

*Source: Statistical Abstract, Punjab; * Both Electrical and Diesel run*

Table 16: Prices of Selected Agricultural Machinery in Punjab

Year	Machinery		
	Tractor (35 HP)	Electrical motor	Diesel engine
2007-08	370000	23000	23000
2008-09	375000	23000	23000
2009-10	450000	23500	23000
2010-11	480000	28500	23500

Source: Department of Economics & Sociology, P. A. U., Ludhiana

Table 17: Variation in Diesel Prices per Liter (Rs) from 2004 to 2018

Year													
2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Diesel price per liter													
6833	51.67	46.01	66.79	52.03	43.47	40.01	38.51	32.76	34.04	32.85	33.65	29.77	24.35

On 21st, August, 2018, diesel price was Rs. 68.99 per liter

With crop intensification, agriculture in Punjab has become dependent on machinery. It helps in achieving the timeliness of various farm operations like seedbed preparation, sowing, spraying, harvesting, and threshing. Further, it offsets the challenges of labor shortages and drudgery involved in farm work and has considerably helped in overcoming the risk of unfavorable effects of weather on maturing crops. In addition , the farmers needed Tube wells and Tractors, a number of agricultural implements such as Seed-cum fertilizer drill, Knapsack spray pump , Vertical conveyer reaper, Tractor operated combine, Self- propelled combine, Thresher, Straw Reaper, Maize Sheller /thresher, Potato planter, Sugarcane cutter planter, Strip-till drill ,Zero till drill, Rotavator , Aero blast sprayer. Some of these implements are needed in lakh, others in thousand and a few in hundreds in the whole of the state. Their costs have been appreciating almost every year to make farming costing lakh for the farmers [28].

i) Labor and Agricultural Wages

With the onset of newer agricultural implants during the last over two decades, the farming also required the skilled persons in addition to the unskilled labor. With the dawn of education, the present generation of farmers would find them less interested in doing the hard agricultural work and thus their predecessors would depend upon the 'foreign labor'- the migrants from U.P. and Bihar states. The situation has become more and more acute with the passage of time as a bulk of the present generation of Punjab farmers has either migrated to the foreign countries or the metropolitans to green pastures. So the lesser number of the skilled and unskilled agricultural laborers was available. And by the law of demand and supply, it resulted in the increase in their wages and, thus, in the rise per hectare labor use.

The per hectare labor use in the cultivation of wheat, paddy and cotton collectively account for more than 85 % of the gross cropped area as given in the Table: 18.

Table 18: Labor Use per Hectare for Crops (Hours per Hectare)

Crop	Year		
	2007-08	2008-09	2009-10
Rice	402.54	417.19	NA*
Wheat	188.01	184.87	177.94
Cotton	803.30	717.78	NA*

Source: Estimates of the cost of cultivation scheme; NA= Not available

Wages, also, determine the importance of a particular sector along with the socio-economic status of the people employed. Table: 19 shows that wage rates for various agricultural operations were, almost, doubled in between 2007 to 2011; implying towards a shortage of labor for the farming sector during the last years.

Table 19: Wages Paid to Agricultural and Skilled Laborers (Rs. per person day)

Crop	Year				
	2007	2008	2009	2010	2011**
Agricultural Laborer for					
Ploughing	106.24	128.12	143.92	151.82	205.50
Sowing	106.96	130.88	141.18	145.80	204.50
Weeding	105.21	123.10	129.75	149.47	197.25
Harvesting	114.08	127.62	186.00	189.61	203.00
Picking Cotton*	107.80		---	141.88	190.00
Other agricultural operations	106.48	137.41	144.25	144.43	215.00
Skilled Laborer					
Blacksmith	195.86	218.44	224.65	226.88	270.00
Carpenter	198.32	216.69	227.37	230.54	267.00

Source: Statistical Abstract; Female; ** During July 2011 to Nov 2011*

j) Depleting Water Level

Groundwater is the main source of irrigation in central Punjab. But the early plantation of rice is depleting the underground water. Thereby, the water table is going down at the rate of 3.0 meters / annum. 90 development blocks have already declared as black, and shallow tube wells are unable to draw water in many areas. Installation and deepening of tube wells due to the dipping water table are appreciating the cost of agriculture/ acre. With low remuneration leading to falling profit margins, the farming is becoming an economically unviable occupation for a small and marginal farmer since it is proving to be an uphill's task to arrange such a massive financial investments from their sources.

(a) The Table: 20 gives the district wise details of pre-monsoon minimum water level or maximum depth of water level. This gives an idea of continuous lowering of groundwater level during the last decade(2007-17) in Punjab indicating that the depletion is very fast in Patiala, Fatehgarh Sahib, Barnala, and Sangrur districts. There is hardly any lowering of groundwater In Muktsar and Nawanshahar districts. On the contrary, many parts of these districts are facing the problem of water logging. Also, a high level of salinity is making it unsuitable for human consumption or irrigation.

Table 20: Water Table (2007 to 2017)

District	Year	
	2007	2017
Amritsar	70	80
Bhatinda	55	80
Faridkot	43	49
F.G. Sahib	102	128
Firozpur	28	33
Gurdashpur	59	64
Hoshiarpur	75	86
Jalandhar	94	119
Kapurthala	90	93
Ludhiana	82	72
Mansa	55	85
Moga	96	69
Mohali	46	42
Muktsar	23	20
Nawanshar	46	48
Patiala	105	130
Ropar	97	107
Sangrur	95	109
Taran Taran	53	72
Barnala	70	109

Source: Punjab Data by Sukhminder Singh

The data for the two new districts Pathankot and Fazilka but not available and are included in their parent districts, i.e. Gurdaspur and Firozpur respectively.

(b) One may expect that the water level will increase after the monsoon season, but in some districts the reverse may happen. This behavior is due to the fact that maximum consumption of groundwater is also during the same period from June to September (rainy season) due to the sowing of paddy crop.

(c) In early 2000, the water table started depleting alarmingly by a meter in Punjab, are the rate came down in 2010 when the state government enforced rule not to allow paddy transplantation before 15 June. The categories of blocks formed on the basis of underground water resources in Punjab during the various years are given in Table: 21:

Table 21: Blocks on the Basis of Underground Water Resources in Punjab

Category (%)	Year(Total blocks)					Over all % Area	Quality of water
	2000(138)	2005(137)	2010(138)	2015(138)	2016(148)		
Critical	11(7.97)	5(3.65)	3(2.17)	--	---	4.0	Brackish; Unfit for irrigation; SW Punjab
Sami critical	16(11.59)	4(2.92)	2(1.45)	---	----		
Over-exploited	73(52.90)	103(75.18)	110(79.7)	102(73.9)	110(74)	80.0	
Safe	38(27.54)	25(18.25)	23(16.67)	----	----	16.0	Kandi Area

**Jain, A.K., Department of soil and Water Engineering, P.A.U., Ludhiana*

In the overexploited blocks, the exploitation is more than 100%. In the critical category, the exploitation is above 85%. In the semi critical-category, the exploitation is 65-85% [29].

(d) The results for the two surveys conducted regarding the crisis of the depletion of the water table from January 2013 to January 2014 and then in between January 2015 to January 2016 are summarized in Tables 22-23:

Table 22: Percent of Wells and Water Levels (Jan 2014) and Comparison with Jan 2013

Water Level Range (Bgl)*	% of Wells	Comparison with January, 2013
0-2 m	8	(a)Water level rose in about 65% and fell in about 34% of wells (b)1% wells showed no change(c)Those showing rise, 58% showed a rise in 0-2 m and 3 % in 2-4 m (d) 30% of showed fall in 0-2 m (e) Maximum rise was 8.23 m and maximum fall was 4.70 m
2-5 m	16	
5-10	21	
10-20	34	
20-40	22	

Below ground level; Punjab: Status of Environment & Related Issues; Last Updated on 10th Feb 2016*

Table 23: Percentage of Wells and Water Levels (Jan 2016) and Comparison with Jan 2015

Water Level Range (Bgl)*	% of Wells	Comparison with January 2015
0-2 m	5	(a)Water level rose in about 36% and fell in about 62% of wells (b)1% wells showed no change(c)Those showing rise, 33% showed a rise in 0-2 m range (d) 56% of showed fall in 0-2 m range (e) Rise and fall is in the range of 0-2 m range
2-5 m	18	
5-10	22	
10-20	29	
20-40	26	

Below ground level; Punjab: Status of Environment & Related Issues; Last Updated on 10th Feb201*

The Moga, Sangrur, Patiala, Jalandhar districts recorded a deeper water level. The depth to water level recorded in the state during January 2016 ranges up to 38.57 m Bgl. Water [30].

(e) The groundwater depleted in Punjab by 55 centimeters in 2015. The Central Ground Water Board (CGWB) recorded fluctuations during January and May 2016 by monitoring 73% of wells covering 60% area of Punjab. It witnessed a fall in the water level. Barring some isolated pockets, the water table in Punjab goes down by 2 meters annually. Of the 142 blocks, 110 are rated as over

exploited, particularly in central Punjab's Sangrur, Barnala, Jalandhar, Kapurthala, Nawanshahr and Patiala districts. In 22 blocks of southwest Punjab, underground water is not fit for human consumption or irrigation, and the area remains waterlogged during rains [31].

(f) The government's initiative to pledge nearly 1.25 lakh new tubewell connections may deepen Punjab's groundwater troubles. Currently, out of 141 agricultural blocks, 102 fall in the 'dark zone.' The water level is 200 feet or deeper in these blocks [32].

k) Deficient Rains

Increasing the number of tube wells would aggravate the groundwater crisis as Punjab did not receive normal rains for the past one decade. In the last 11 years (2005 – 2015), the rainfall during monsoon 2014 (June – September) was least in Punjab. Out of 20 districts for which data is available, the seven districts (35%) received scanty rainfall, nine districts (45%)district received deficient rainfall and only four districts(20%) in the state received normal rainfall. In short, excepting 2008, the state witnessed drought in rainfall. Even with the deficient rainfall, the farmers managed to save their crop by running all 14 lakh tube wells,' says Rajesh Vashishth, Joint Director Department of Agriculture's hydrology division [32]

(a) The average rainfall during 2005-15 is given in Table 24:

Table 24: Monsoon Rainfall (mm) in Punjab

Year	Actual	Normal	Departure (%)
2005	445.1	501.8	-11.3
206	436.5	-do-	-13
2007	340.4	-do-	-32.2
2008	603.7	-do-	+20.3
2009	323.4	-do-	-35.5
2010	458.2	496.4	-7.5
2011	459.2	496.4	-7.5
2012	266.0	496.3	-46.4
2013	477.9	491.5	-2.8
2014	243.9.	491.5	-50.4
2015	358.0	--do--	-26.2

I M D; Southwest Monsoon for Punjab

The districts along the Shivalik hills i.e., Gurdaspur, Pathankot, Hoshiarpur, and Ropar, receive maximum rainfall. The average annual rain fall is about 200 mm in the southwest region of Punjab which includes districts of Fazilka, Mansa, and Firozpur.

(b) The five-year annual average rain fall in Punjab was479.8.9 mm (47.99 cm) during the years 2012 to 2016. It was recorded as 437.6 mm during the five year period of 2006-2010.

(c) Data of the district wise average rain fall in Punjab during 2012-16 are given below in Table: 25.

Table 25: District wise Average Rainfall (mm)

District	Average Rainfall 2012-16
Amritsar	516.5
Bhatinda	381.1
Faridkot	457.6
F.G. Sahib	400.0
Firozpur	183.1
Gurdashpur	1167.8
Hoshiarpur	504.8
Jalandhar	411.0
Kapurthala	650.4
Ludhiana	443.8
Mansa	186.4
Moga	435.0
Mohali	616.6
Muktsar	374.8
Nawanshar	658.8
Patiala	421.5
Ropar	803.1
Sangrur	335.9
Taran Taran	370.9
Barnala	277.0
Punjab	479.81

Source: Punjab Data by Sukhminder Singh

The table shows that Gurdaspur district received the maximum rains (1167.8 mm) while Ferozpur district recorded the least rainfall (183.1 mm). Data for Pathankot and Fazilka are not available but are included in their parent districts i.e., Gurdaspur and Firozpur respectively. Dhar Kalan block in Pathankot district is the wettest place, and Abohar in the Fazilka district is the driest place in the state.

Almost 60-70% of annual rainfall in Punjab occurs during the monsoon season (July to September); being maximum in August and least in October and November. The Table: 26 represents the average monthly rainfall in the state during the five years period from 2012 to 2016(479.81mm).

Table 26: Monthly Rainfall in Punjab

Month	Average Rainfall (mm)
January	19.5
February	22.7
March	31.9
April	16.1
May	14.4
June	56.3
July	116.0
August	124.4
September	62.7
October	7.3
November	1.6
December	6.9

Source: Punjab Data by Sukhminder Singh

l) Farmers cannot do without Moneylenders (Arhtiyas)

Cooperative societies provide short-term formal loans for the day to day agricultural expenditure. But for expenditure on costly inputs like installation of a submersible pump which may cost Rs. 3 lakh and even various households like providing education to the children, emergency medical expenses the loans, at any time of the day, is available to farmers only by *arhtiyas.* Farmers who take land on the lease for cultivation have to bear the extra cost of rent of land and expenses of cultivation since the institutional sources do not lend on such lands. Thus starts a vicious cycle of taking more costly loans. Further, the farmers have no choice but to sell their produce only through their lenders. The high production costs make it difficult to pay the farm rent despite the fact that the lease rent during this year is much less than the previous year (Rs 20-25K/ acre from Rs.30-35K/ acre). Ramanjit Singh Sikki, a Congress MLA representing Khadoor Sahib Assembly constituency (2017) remarks [33]:

"The only reason farmers are still taking land on a lease is to renew their bank limits and save them from becoming bankrupt socially."

m) Unemployed Man-power and low auxiliary non-farm income opportunities

Punjab, being a predominantly agricultural state, only the seasonal work is available to a vast majority of the ruralites who loiter away their time to result in colossal wastage of the man-power. The unemployed rural educated youth constitute approximately 54 % of the aggregate of rural unemployed in the state [16]. Paradoxically, the high level of mechanization in sowing, irrigation, and harvesting of paddy and wheat has progressively replaced human labor by machine labor. Power draught has virtually disappeared from the agricultural scene in Punjab [34]. A small holding of the land needed fever people from their respective families while other members would while away their precious time without any contribution to the family income. With such a meager income from the farming, it becomes impossible to lead a minimum quality of life. There are a few cottage industries available in the vicinity of their villages which could, well, serve as a mean to utilize the surplus labor force by employing them in some monetarily gainful work of their choice so that they live with the family and were also available in case of any need.

n) Green Revolution Aftermath: Drug Menace: Loss of Farming and Human Lives

Green revolution turned out to be a whole sort of good thing for the Agricultural Economy of Punjab as it created an enormous wealth up till the nineties. Mediocre left Punjab for green pastures and settled in other countries. The ones left were either affluent farmers (who would not like to migrate) or were paupers (who could not afford. Now this new progeny (generation) of the old hard working farmers has either access to immense wealth-*the jazzy cars* or were financially hard pressed. The former category of farmers would not want to *break their back* toiling in the farms and would give those jobs to the people from the states of Bihar and U.P. who are poor and were willing to do the hard farm labor. The second category of poor farmers with meager resources tried for some jobs, but would not get. Thus both types of young farmers were pushed towards the drugs- the former out of plenty *to get high* while latter category of farmers got addicted to drugs to *release their frustration*. But both type of farmers purchase drugs by selling their landed properties. This caused a decline in wealth, sale of the farms and loss of their precious health coupled with many other socio- economic problems. But even the large faring have started feeling the pinch as the fuel, farm machinery, labor and harvesting costs have all gone up, while crop realizations are plunging and thus the lease cost is declining.

o) Roles of State and Central Governments Viz. - A- Viz. Indebtedness of Farmers

The wrong policies and adverse political decisions of both the State and Central governments have also contributed to some extent, for the trap of the indebtedness of the Punjab farmers as follows:

p) Paid the price for the Trifurcation of Punjab

The trifurcation of Punjab into Punjab, Haryana, and Himachal (1st November 1966) had a severe effect on its resources. Himachal, received mineral resources and Haryana received fully developed industries near Delhi. Punjab could neither retain the minerals nor the industrial set up.

q) J.S. Sandhu and Arijit Singh wrote

"With the reorganization of the state in November 1966, developing industrial complex around Delhi fell to the share of Haryana and whatever mineral and forest resources that were available went over to the

Himachal Pradesh. As a result, the growth of the industries in the state further suffered a setback"[35].

Also, Punjab lost a chunk of fertile soil though somewhat less than Punjab; of Ambala, Karnal, Kurukshetra, Kaithal, Faridabad to Haryana. It produced only 26 lakh ton of food grains in 1966, but today its production has reached over 163 lakh tones [35]. Despite having scant rainfall in several parts, Haryana, one of the smallest states in the country with 40 lakh hectares, has grown from a food deficient to a food surplus state. With just 1.5% of the country's land, make it the second biggest contributor to the national food basket. Its contribution is15%, i. e., wheat 58.56 lakh ton and rice 23.91lakh ton. It weakened the position of Punjab in the national political scene as Haryana became one of the leaders for political competition in the Hindi belt rather than remaining as a sub-region of Punjab. It would, now, compete with other states rather than with the 'elder brother' concerning resources [36].

r) Ignored the Warning Bells of the Seventies

Three points to note are:

(a) After over a decade of the Green Revolution [37], the warning signs started emerging as revolution benefitted the big farmers more than the small farmers. The middlemen who provided credit, access to inputs, and a channel for the quick sale of produce became important like the moneylenders who had always been a powerful group even during the pre-Independence era. The agriculture would not absorb enough labor. But the armed services recruitment as well as the migration of the farmers to the West proved to be a saving grace. The latter category of the peasants also brought an additional avenue for surplus rural labor.

(b) The global economy and the level of conflict in national politics deteriorated in the 1970s. There was chaos in Punjab in the eighties with enormous human, social and economic losses.

(c) To add to the misery, the state political leaders vied for competing with one another and even with their sister states like Haryana and Himachal for natural resources such as river water and electric power, rather than finding out the means to move Punjab state up in the development ladder.

s) No Elected Government for about a decade

In Punjab, President's rule remained in vogue for about ten years (3510 days) due to the disturbed political conditions. So there was no state leader who would take care of the state which had been trifurcated only two decades before and have faced a severe crunch in its economic resources.

t) Punjab Neglected during Economic Liberalization

Even in the era of Economic Liberalization initiated in June 1991 by Rao and Singh [38] Punjab remained the worst placed due to the lack of any credible state leadership. The decontrol on industrial licensing did not help in giving a flip to the investments in the state. Since the Agriculture remained heavily regulated and dominated by the production of grains for the PDS, did not benefit from decontrol. Supporters of economic reforms consisting of liberalization policy patronized secondary (Industrial) and tertiary (Manufacture and Employment) sectors as indicated by their respective growth during the period. Punjab economy grew at the rate of 5.3% per annum as against 5.5% in the case of the national economy[39] Agriculture, a sub-sector of the primary sector started experiencing a decline in its growth rate while Secondary and Tertiary sectors experienced positive growth as given in Table:27 [40]:

Table 27: Growth of Primary, Secondary and Tertiary Sectors during Economic Liberalization

Year	% Growth Rate of		
	Primary (Agriculture) Sector	Secondary(industrial) Sector	& Employment) Sector
1980-85	4.66	4.93	2.97
1985-90	3.91	5.75	4.46

Declining rate of the growth in the Agriculture sector was the practice of concentration, i.e., to grow wheat and rice. "The other food crops such as maize, bajara, barley, gram, and pulse were neglected whose share in the total food grains were just 1.95% in 2011-12" [41].Support from the agricultural sector to the economy of Punjab decreased because the production level has reached to the point of saturation. The Table: 28 will prove this point for three major crops (wheat, rice, cotton) in different sets of years that the yield has increased but their rates of growth is slowly declining. It, also, proves that the Green Revolution has outlived its utility. There is no scope to increase the area under agriculture as almost 99 % of the cultivable land is under plow, and already 97.9 % of the cultivated area is under irrigation [42].

Table 28: Saturation in Average Yield

Crop	Year	Average Yield*
Wheat	1990-91	3715
	2010-11	4693
	2011-12	5097
Rice	1990-91	3229
	2010-11	3828
	2011-12	3741
Cotton	1990-91	285
	2010-11	472
	2011-12	449

**k g/hectare*

The stagnation in agriculture was not the only problem. Also, the declining quality of soil and falling levels of groundwater due to the excessive use of water and increasing use of fertilizers and pesticides used to enhance the productivity played havoc in agriculture. Agriculture is still the most contributing sector in the economy of Punjab with wheat and rice remaining dominant at the cost of other crops in the post liberalized period

u) Distorted Cropping Diversification and Depleting Ground Water Level

Encouraged by the increased subsidies for water, electric power and fertilizer by the central and state governments, farmers of Punjab opted for Water-intensive crops such as rice and sugarcane at the cost of decrease in the acreage under wheat(Table:29). This diversification created new lock-in effects for farmers to go with those for wheat under the PDS. In addition, it caused a severe depletion of the ground water table which had to be pumped at alarmingly high rates, increasingly micronutrient deficient soil and, thus, an imminent ecological disaster. The area under wheat and paddy has increased manifolds during the last five decades, whereas the area under oilseeds, pulses, maize other cereals has decreased sharply while the area under cotton & sugarcane has remained more or less constant.

Table 29: A Shift in Cropping Pattern of Nine Important Crops From 1960 to 2017 (Area in' 000 hectares)

Crop	60-61	70-71	80-81	90-91	2000-01	05-06	06--07	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Wheat	1400	2299	2812	3273	3408	3469	3467	3526	3522	5310	3527	3517	3512	3505	3808	3500
Rice	227	390	1183	2015	2611	2647	2621	2734	2802	2831	2811	2845	2851	2894	2980	3033
Cotton	446	397	648	701	474	557	614	528	511	484	516	481	446	420	339	285
Maize	327	555	304	183	164	151	154	152	140	134	129	131	130	126	127	118
Sugarcane	133	128	71	101	121	85	99	81	60	70	80	83	89	94	92	87
Pulses	903	33	58	73	42	32	30	25	21	98	61	64	56	49	44	78.6
Mustard	54	57	77	70	64	51	46	35	39	41	38	41.8	38.7	41.8	32	50.7
Sesamum	4	15	17	18	19	0.2	0.2	0.2	?	?	?	?	?	?	48	20
Groundnut	67	174	83	11	4	3	4.4	3	3	2	2	1.6	1.3	1.4	1.9	1.5

Source: Department of Agriculture, Government of Punjab (www.agripb.gov.in)

Of course, the cropping intensity (ratio of net sown area to gross cropped area) in Punjab has increased sharply from 126% in 1960-61 to 191 in 2012-13 as given in the Table: 30.Punjab can boast of having the highest cropping intensity in the country closely followed by West Bengal (185%), Haryana (181%), Himachal Pradesh (173%) and Orissa (162%) as compared to all India percentage 138% [43]. But it has severely affected the soil fertility as it leaves no time for the natural rejuvenation.

Table 30: Cropping Intensity in Punjab State

Year	1960- 61	1970-71	1980-81	1990-91	2000-01	2007-08	2008-09	2009-10	2011-12	2012-13	2013-14
Intensity (%)	126.0	140.0	161.0	178.0	186.0	187.96	189.69	189.00	190.00	191.00	189.00

Source: Department of Agriculture, Punjab, 2013

Compound Annual Growth Rates (CAGR) for the main crops of state in 8th to 11th five year plans and for the overall study period (1992-93 to- 2010-11) are presented in Table: 31. The data indicate that the major contributor towards wheat production over this period was the increase in the yield. Plan-wise major increase in wheat area, production and yield were observed during the 9th plan. Except potato, CAGR of the area of all other major crops in state viz. cotton, maize, pulses, oilseeds, and sugarcane during this period were found to be negative.

Table 31: Overall Compound Growth rates of Major Crops

Crop	b	Overall (1992-93 to 2010-11)
Rice	A	1.56***
	P	2.79***
	Y	1.2***
Wheat	A	0.47***
	P	1.16***
	Y	0.69***
Maize	A	-1.47***
	P	2.18
	Y	3.71***
Gram	A	-12.48***
	P	-10.82***
	Y	1.86***
Sugarcane	A	-2.08*
	P	-2.87**
	Y	-0.23ns
Cotton	A	-1.56**
	P	2.29ns
	Y	3.91**
Potato	A	6.07***
	P	7.45***
	Y	1.32**
Total Cereals	A	0.82***
	P	1.78***
	Y	0.95***
Total Pulses	A	-9.86***
	P	-9.50***
	Y	0.41ns
Total foodgrains	A	0.73***
	P	1.76***
	Y	1.01***
Total oilseeds	A	-7.12***
	P	-6.89***
	Y	0.25ns

- *Constitutes initial four years of the plan; ns= Not significant*
  ****, ** and * Significant at 1, 5 and10 % level of probability*

b. A= Area in lakh hectare; P= Production in lakh ton and Y=Yield (Productivity) in kg / hectare

v) Misplaced Priorities of Punjab State

In Punjab, the number of electricity-operated tube wells have increased from 5 lakh in early 1980s to 12.5 lakh in 2001-02.The farmers installed about 3.25 lakh tube wells during1996-01 as the state government had announced free power to farmers in 1997 [43]. But the number of diesel-operated tube wells remained more or less the same since early 1990s, i .e., at about 1.5 lakh [43]. Fearing that Punjab may turn into a desert in 15- 20 years and degradation of the fertile agricultural land may become a problem, a study instituted by Central Ground Water Board (CGWB) for mapping of aquifers (underground bed) up to 300 meters. Also, NASA report cautions as:

"The National Aeronautics and Space Administration (NASA) of the US had, also, warned that agriculture output in Punjab and Haryana could collapse if groundwater is extracted ruthlessly and even the Central Ground Water Board has been issuing warning to Punjab for many years now".

Despite the warning, the government's initiative to pledge nearly 1.25 lakh new tube well connections this year is likely to deal a blow to the already depleting underground water level as it will initiate the farmers of the state to choose rice cultivation due to free irrigation facility. "The new connections would encourage farmers to go for more paddy cultivation which has an assured market and price. The 'diversification scheme' aiming to divert area from paddy to other crops will receive a major setback" [32]say experts in the state's Department of Agriculture. They further add that:

"Already, the area under cotton in the state has gone down by over 1.5 lakh hectares compared with last year's on fears of the white fly attack, and now a major portion of this cotton area may go under paddy"[32].

w) Possible Solutions

The government is very much aware of the agrarian crisis and rural suicides. It, acknowledges that the current cropping pattern is not viable and has

put forward the crop-diversification policy. We start from a scratch:

x) Shelve Installing 1.25 Lakh New Tube wells

(a) At the onset, there is hardly any justification of installing more when there, already, exist 12.76 lakh electricity operated, and 1.50 lakh diesel operated tube wells[32] for an agricultural land area of about 42 lakh hectare; approximately 11 Lakh hectare of which is irrigated by canals [32]. More importantly, there is no justification in having 15 lakh tube wells for 11 lakh farmers in Punjab. The top experts in their respective fields also advise against the idea of dipping new tube wells because:

i. The release of 1.25 lakh tube well connections would cost over Rs 500 crores and the power subsidy in the state would rise to about Rs. 6,000 crores.
ii. During paddy season, when the rainfall is in deficit, running of 14 lakh tube wells simultaneously puts huge pressure on the groundwater which , on the average has gone down 200 feet or deeper in nearly 80% area of Punjab including the entire Majha and Doaba regions and some districts of Malwa like Patiala, Moga, Sangrur.
iii. In the current year, the state government has already waived off Rs. 5,484 crore as power bills of farmers.
iv. The cost of installing a 5 HP motor for irrigating two hectares of land costs anywhere between Rs 60,000 to Rs 65,000 to farmers. However, farmers, mostly, go for deeper tube wells due to depleting groundwater, and prefer, high-capacity motors of 7.5-12 HP which cost between Rs. 1.5 to 2.5 lakh per piece depending on the depth.

y) Promote Schemes for Less Water Consuming Kharif Crops

No doubt, the state government would spend about 6000 crores on the free power subsidy to the farmers, but they should also promote less water consuming crops and support their marketing with the power subsidy amount. A number of other steps to save underground water reserves such as the Contract Farming (CF) program (2002), New Agriculture Policy for State (2013) and passing the Punjab Preservation of Subsoil Water Act (2009) to divert areas under the water consuming rice crop towards other Kharif crops were not implemented vigorously. Contract Farming is essentially demand/market driven, unlike traditional farming that first produces a commodity and then looks for its market. Punjab Agro Food grains Corporation (PAFC) has succeeded in barley malting and is given in Table: 32. Also, Punjab farmers have also shown concern for contract farming in some other crops (Table: 33)

Table 32: Area (Hectares) under Malting Barley

Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Area under Malting Barley	4850	6000	2800	2780	960	830

Source: Punjab Agro Food grains Corporation

Table 33: Area (Hectares) under Different Crops under Contract Farming

Crop	Year			
	2007-08	2008-09	2009-10	2010-11
Hyola	13273	14216	7254	---
Basmati Pure	33614	33606	31966	28322
Maize	45405	32827	33028	---
Green Pea	---	448	449	254
Potato Seed	---	---	1625	1671
Total	92292	81097	74322	30247

Source: Statistical Abstract, Punjab

The area under rice cultivation remains between 27-28 lakh hectares. But the production of a special brand of Punjab called "Flavored Basmati" is being encouraged by planting it over five lack hectares to produce about 20 lakh ton. Its export was, previously, refused by European and Arab countries because a quantity of pesticides/ k g was found to be more (1.0ppm) than the prescribed limit of 0.01ppm/k gm. P.A.U., Ludhiana has, now, recommended to replace certain pesticides for more effective brands [44].

z) Regulate Underground Water and Fertilizer/ Pesticides Usages

We find the groundwater at 200 feet. It is going at a lower level day by day and needs some efficient technologies to regulate it as it like a' *fixed deposit in a bank.*'[45]. Moreover there is no logic behind having a tube well for every 2.0-2.5 hectare. The excessive use of fertilizers and pesticides are now polluting the underground water and the produce of the farmers. The government needs to caution the farmers.

aa) Loan Waiver – A Need of the Hour

According to the RBI report on the study of state government budgets, Punjab's annual debt is running at 31.4% of the gross state domestic product (GSDP) in 2015-16..It is the second highest rate of indebtedness, with West Bengal topping the charts with a debt to GSDP ratio32.9% in 2015-16 [46].There is three ways to pull out the state from its poor economic health:

(a) There are approximately 18.5 lakh of farming families in Punjab. About 65% are small and marginal. 70% of these families have access to institutional finance. Punjab government, like U.P. and Maharashtra states has announced a Rs. 24000crores loan waiver to the farmers [47]. This move will benefit 10.25 lakh farmers. About 8.75 lakh of these farmers own up to five acres of land. (b) As the water level has gone down critically, the government at the center should give subsidy on installing tube wells.(c)The Centre must announce a policy of crop diversification and give special packages for it.

bb) Create Employment for Punjabi Youth

A policy for creating employment for Punjab's youth must be in place both from the Centre and the state governments. Punjab being a predominantly agricultural state, only the seasonal work is available to a vast majority of rural people which results in colossal wastage of the manpower. Even the small holding of the land needed fever people from their respective families while the other members would while away their precious time without any contribution to the family income. The cottage industries can serve as a mean to utilize the surplus labor force by employing them in some work of their choice in some small industry in the vicinity of their villages. This way, they will supplement the income by living with their respective families, and will also available in case of any need. The paradox of the conflict between the rural unemployed youth and governments at the State and the Center is summarized by S.S. Gill [34] as follows:

There is generally a mismatch between the aspirations of the unemployed and the policies pursued for creating employment opportunities. Rural educated job-seekers aspire to secure white-collar government or semi-government jobs. On the other hand, the government is not willing to act as a major employer of such youth. Alternative opportunities for skill-development through vocational training have to be popularized at the village level. Simultaneously, the corporate sector has to be encouraged to enter the rural areas with their programs, so that employment generation activities are created. Self-employment skills have to be imparted and credit facilities made available for translating their aspirations into reality in rural areas.

The machinery of the Planning Commission needs to be activated with well thought-out policies and action program, as the task is colossal and calls for multi-directional co-operative efforts'.

cc) Finally a Relief: Government Approves Hike in MSP

Since the government wanted the rural incomes to be robust, it has given its approval for an increase of 4.13-52.47% for the 2018-19 than those of the 2017-18 M S P for 14 Kharif crops [48] which will cost the exchequer over 15,000 crores is higher than the full paid-out costs (A2+FL) by 50.09- 96.97%(Table: 34).

Table 34: Approved MSP for Kharif Crops from 2015-16 to 18-19 (Rs per Qtl)

Crop	Year	Variety	SP (Previous)*	MRP (2018-19)*	Increase(%) over2017-18	Return*over Cost (%)
Paddy	2017-18 [2016-17] 2015-16	Common	1550 [1470] (1410)	1750	200(12.90)	50.09
	2017-18 [2016-17] 2015-16	Grade-A	1590 [1510] (1450)	1770	180(11.32)	51.80
Jowar	2017-18 [2016-17] (2015-16)	Hybrid	1700 [1625] (1570)	2430	730 (42.94)	50.09
	2017-18 [2016-17] (2015-16)	Maldandi	1725 [1650] (1590)	2450	725(42.03)	51.33
Bajra	2017-18 [2016-17] (2015-16)	---	1425 [1330] (1275)	1950	525(36.84)	96.97

Ragi	2017-18 [2016-17] (2015-16)	---	1900 [1725] (1650)	2897	997(52.47)	50.01
Maize	2017-18 [2016-17] (2015-16)	---	1425 [1365] (1325)	1700	275(19.30)	50.31
Arhar(Tur)	2017-18 [2016-17] (2015-16)	---	5450 [5050] (4625	5675	225(4.13)	65.36
Moong	2017-18 [2016-17] (2015-16)	---	5575 [5225] (4850)	6975	1400(25.11)	50.00
Urad	2017-18 [2016-17] (2015-16)	---	5400 [5000] (4625)	5600	200(3.70)	62.89
Groundnut	2017-18 [2016-17] (2015-16)	---	4450 [4220] (4030)	4890	440(9.89)	50.00
Sunflower Seed	2017-18 [2016-17] (2015-16)	---	4100 [3950] (3800)	5388	1288(31.42)	50.01
Soyabean	2017-18 [2016-17] (2015-16)	Yellow	3050 [2775] (2600)	3399	349(11.44)	50.01
Sesamum	2017-18 [2016-17] (2015-16)	---	5300 [5000] (4700)	6249	949(17.91)	50.01
Nigerseed	2017-18 [2016-17] (2015-16)	----	4050 [3825] (3650)	5877	1827(45.11)	50.01
Cotton(Staple)	2017-18 [2017-18] (2015-16)	Medium	4020 [3860] (3800)	5150	1130(28.11)	50.01
	2017-18 [2016-17] (2015-16)	Long	4320 [4160] (4100)	5450	1130(26.16)	58.75

- *Includes Bonus*

DK Joshi, Chief Economist at CRISIL says:

"The weighted average MSP increase (crop weights being the quantity procured last year) comes to around 13%. Assuming the procurement of Kharif crops would be as much as last year, the higher M S Ps would cost the government about `11,500 crores. But the actual cost incurred could be substantially higher as procurement was set to increase"[49].

The paddy MSP increase for the Kharif 2018-19 is the steepest ever in absolute terms at Rs 200 per quintal (12.9%), except that it was 21.0 % in the 2008-09 seasons. Also, the new MSP for tur is just 4.1% higher than last year's MSP (despite being 65.4% higher than A2+FL cost, i.e., Actual paid out cost plus the input value of family labor) against a year-on-year increase of 26% in 2008-09. Since the procurements have been limited to rice and wheat, the government's costs have been prevented from being flaring up to unmanageable levels.

The Government of India has announced a number of Farmer Friendly Initiatives in its 2018-19 Budget

All said, the Central government should not leave the farmers of Punjab to fend for themselves in their time of crisis as this state has always served as *India's breadbasket'*. They are expected to ensure Price stability, Marketing Facilities, Arrangement of the sale of their crops, Supply chain extension, Water –Saving Technologies, Liberal Loans at the reduced rates of interest and Subsidies and announce a policy of diversification of cropping pattern.

IV. Conclusion

No doubt, Punjab is known as being the 'breadbasket' of India, but excepting a brief respite for about one and half decade during the 'Green Revolution' period (1967-78), the economic health of its beleaguered farming community continued to deteriorate as the agricultural debt swelled from Rs 57609 crores (576.09 billion) to Rs. 69355 crores (693. 55 billion) during the period: 2006-07 to 2014-15[50]. Fragmentation and small holdings of agricultural land, spending lavishly on social ceremonies, the sudden appreciation of the values of the agricultural land and produce made young generation of the farmers disinterested in the hard labor of farming and would depend upon the agricultural labor from U.P. and Bihar. There came a steep rise in the costs of agricultural implants, the wages of the laborers, the seeds, the tractors, diesel and the installment of tube wells because of depletion of groundwater level. Despite the bumper crops, the input cost of agriculture would far overweigh their earnings from the produce. There was 54% rural unemployed man-power. Both the Centre and the State governments did pretty little in easing the farmers out of this vicious cycle. Even during the Economic Liberalization period, Punjab did not benefit much because the emphasis was more on Secondary and Tertiary Sectors while the Agriculture sector of Punjab economy was neglected. The farmers were too stressed to commit suicides in thousands. The State Government have, now, agreed to waive off Rs.24000 crores of the debt of the farmers in phases while the Centre Government have raised the MSP ranging from 4.13-52.47% in case of 14 Rabi crops for 2018-19.

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