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## Understanding the Relationship Between National Food Security, Dietary Habits and Agrarian Policy: Case Study on India's Green Revolution

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#### ABSTRACT

In the aftermath of the food crisis in India during 1965-66, and the neglect of the agrarian sector in the initial Five- Year Plans, a nation whose economy benefited mainly from primary sector suffered hardships. The New Agriculture policy, which sought to eradicate and limit these national problems, was profit oriented and technology- oriented. While the government's response sought to focus on rapid production, market pricing mechanisms underwent interesting changes. The resultant effect of market forces driven in a single direction towards rice and wheat failed to provide nutritional security by focusing on 'food security'. The hidden hands of the capitalist market, then, and the motives are sought to be examined.

The paper attempts to analyze the Indian experience of the Green Revolution and its influences on the pricing mechanism, which hampered the growth of the 'untargeted' crops. The dominant presence of two crops, Rice and wheat, and the consequent surplus generated is attempted to be studied through Marx's *Capital*. The industrial extraction from nature which culminated in an environmental crisis was harmful to both the soil and labourer. This active relation of man to nature, enabled by scientific ideas and technology in the capitalist society, then shows the destructive potential of capitalism and its inherent instability.

**Keywords:** *Green Revolution; Nutrition security; Food security; Five year plans; Agrarian studies; applied social research.*

Indian Agriculture forming the largest constituent of the primary sector, remains the hotbed of research works and new cause-effect relationships in productivity levels. The debated governmental intervention in the form of Green Revolution was an ambitious project which saw an import of many farming inputs and new policy visions. The endeavour for massive production in the agricultural sector led India to join the global network of economies striving for 'modernisation of agriculture'. The programme was strategized towards targeted areas and districts to produce the 'maximum output' and gain 'maximum productivity'. This, however,

produced devastating regional differences which were as much physical as social. The foundations of the High Yielding Varieties Programme (HYVP) was laid through the Ford Foundation Team's report on "India's Food Crisis and Steps To Meet It" (1959). The scientific development works done by the Rockefeller Foundation in making high-grade fertilizers was equally influential. The scientific advancements were more critical for overcoming the nationwide hunger, out of food shortage, then for the ongoing development of the sector. The agrarian crisis witnessed by India during 1965-66 and 1966-67 set the wheels on motion and sped up the process of 'modernisation'. With the

onset of the High Yielding Variety Programme (HYVP), the year 1965 marked India's more rigorous 'capitalist approach' to push high the productivity levels.

According to a study done by the Planning Commission (1971), HYVP included prospects for scientific research advancements, increased supplies of inputs, intensive training and productivity growth. This was, however, not a program which channelized energies in a unilinear fashion but was a set of five individual strategies outlined for different crops. These crops constituted of namely, paddy, wheat, maize, sorghum (jowar) and millet (Bajra). The official data showed that the spread of High Yielding Varieties (HYV) wheat increased from nearly one acre in 1966-67 to around 12 million acres in 1969-70, which went as high as 14.6 million acres during 1970-71. While a significant increase was observed for rice and wheat, the official data for the percentage of area under HYVs to the total area for millet, maize and sorghum were 10%, 8% and 3% respectively.

The effectiveness of this programme was appreciated by many researchers like Per Olav Reinton (1973) who writes of the increased output per unit of local wheat in India. During the decade from 1958-68, the

recorded increase was more than 100%. While this 'gene revolution' with its use of advanced and hybrid seeds, fertilizers is celebrated for its positive growth, the same research works became the point of contention for many economists and scientists. The programme was criticized for its lack of randomized controlled trials, inadequate factorial design and biased results. The real effect of High Yielding Variety seeds remains an area of disagreement between economists and agriculturalists. Many contend that other favourable conditions, particularly those in the northern states are not accounted for and the contribution of these 'miracle seeds' solely survives.

The difficulties before Indian agriculture were huge, as it had not fully recovered from the agrarian crisis and was on its own, an immature capitalist sector, strung with some feudal bonds'. The farming practiced in India till then struggled with a lesser production of local variety crops, which were insufficient for international export requirements and standards.

The trickle-down approach from the profits in heavy industries, as had been thought of in the initial Five Year Plans (FYP) clearly failed. The massive developmental policies

for large scale industries, which remained the primary focus, particularly for the first three FYP, contrasted with the restricted emphasis on agrarian sector.

After the prolonged ignorance to agriculture in our national planning, what followed was an emergency situation demanding suitable solutions. It is at this point, that the impacts of agricultural research projects began to be gauged through critical evaluations. Due to the abiotic and biotic stress, the agriculture-nutrition interlinkages were studied and experimented with to help the country as a whole in the recovery. Under the guise of this distressful situation, the private and international foundations began conducting pilot studies to increase yields for specific food crops, while negating other crops due to “lesser experimental scopes”. The market, then driven by capitalist fervour worked not on the spirit of ‘diversification of agriculture’ but ‘monopolisation’.

The wheat varieties, such as PV-18, S-277 and S-308, were produced by The International Wheat and Maize Improvement Centre (CIMMYT), based in Mexico, and likewise, the rice varieties by the International Rice Research Institute (IRRI) based in the Philippines. While the

motive behind farmers choosing rice and wheat was simple: fewer risks, long storage.

But, no accountability was observed for the damaging results-monoculture, loss of biodiversity and depleting groundwater table. Although this government policy was more focused on rapid food production than nutrition, the farmers incentivised by the government were set free in a frenzied manner with the freedom to choose. The ‘accumulation of surplus’ originating within the production chain, which for Marx, traces the beginning of the vampire-like capitalist system became the single motive of the farming community. But this surplus could only be generated by the ‘capitalist farmer’ only if he had the option to opt for the most ‘profitable’ crop in the food market. The traditional farmers, who despite the nominal fertilizer subsidies and other benefits such as (Minimum Support Prices) MSP, could not engage with the market opportunities to derive significant gains, became an insignificant producer in the mechanised environment.

Sorghum and millets, mainly grown in arid and semi-arid regions of the country are a staple diet of a majority of poor consumers and small landholders. Under the limited scopes for irrigation, they continue to be the

richest sources of nutrition among cereals, particularly for calcium, zinc and iron. They are relegated as ‘inferior crops’ or ‘orphan crops’ despite their capability of providing all the nutrients at the least cost compared to rice and wheat. (Rao et al. 2006) The major factor behind the declined production and consumption of cereals like pearl millets and

finger millets has been the food security strategy of the Indian government to supply subsidised wheat and rice through the Public Distribution system(PDS). Market imperfections, ‘market failure’ to recognise nutritional properties and poor consumer awareness are the prominent reasons for the declined growth of these crops.

Table 1

*Targets of High Yielding Varieties Programmes*

Sl. No.	crop	Base Level (1968-69) <sup>a</sup>	Cumulative level (1973-74) <sup>b</sup>	Additional Target <sup>c</sup>
1	Paddy	2.6	10.1	7.5
2	Wheat	4.8	7.7	2.9
3	Maize	0.4	1.2	0.8
4	Jowar	0.7	3.2	2.5
5	Bajra	0.7	2.8	2.1
6	Total	9.2	25.0	15.8

*Note.* The data entered in a,b,c columns is in million hectares, From chapter 7, “Agriculture”, Fourth Five Year Plan (1969)

According to the Fourth Five Year Plan (1969), significant variations in the performance of individual food grains were observed in the studies conducted from

1949-50 to 1968-69. The output of rice, wheat and maize grew significantly, whereas the output of pulses grew was slow and the growth itself was nearly less than half as that



of cereals. Also, the results showed a decrease in the average output per hectare of pulses. As seen in Table 1, the pulses were not the targeted crop to be researched and experimented on. Though the policy, formulated in the background of food shortage and agrarian crisis, had its primary goal as food security and not nutritional security, the market seemed to exhibit profit motives. The lack of recognition of other food grains by both the market and the community of scientific researches raises questions on the capitalist tendencies of the market in a welfare seeking country. A probable explanation would be that the 'gene' experimentations with these crops were never on full throttle as was with wheat and rice. This unexploited area of knowledge, then produced what can be called a 'monopolisation of food grains' in the food market, the capital of which was not gained by all.

The incapability to focus on other crops like Soyabean and its "yellow revolution" prominent in central India is a complaint which remains unresolved and ignored in the market narratives. The beginnings of this 'yellow seed' revolution are traced back to the mid-1960s when research was conducted by the American agronomists from the

University of Illinois at Jabalpur Agricultural University, Madhya Pradesh and G B Pant University of Agriculture and Technology in Uttar Pradesh. Despite some initiatives, Soyabean's 'unmarketability' as a food crop and lesser appeal to the consumers in comparison to others ultimately failed to bridge the "protein gap." (Kumar & Siegel, 2017) The dietary need for other such produces were immense but never were given much importance by the consumers or the producers.

This failure of a capitalist system to sell commodities to consumers remains underpinned with 'motives' as hidden as the workings of commodities circulations. Many agricultural scientists and writers (Easterbrook, 1996) criticise that such structural changes were based on the western model of agriculture, whose revolutionary 'seeds' were not even examined with a proper understanding of individual countries. A mere import of this First World model, therefore, does not guarantee positive impacts in the Third World in the same way. Robert Herdt (2012), who commissioned in the Ford and Rockefeller Foundations in India in the 1960s, and later for Indian Rice Research Institute (IRRI), urged the agricultural

scientists to keenly examine the specificity of spatiotemporal variations and physical conditions of countries before using the technology. These technologies, Herd writes, must undergo redevelopments as a mere transferring them from other countries will have narrow scope without localised research. A bottom-up approach, wherein the capacity building of people to conduct adaptive researches and implement policies, is focused upon.

The basic principle of the creation of a commodity, as Marx writes, is that man must change the natural forms of materials to make use of the resultant products through the usage of his industry. The wealth of Indian agriculture, which was striving to resemble with that of a capitalist one, presented itself as a concentrated assembly of commodities. The single commodity, the genetically advanced food grains, whose widespread adoption, led to a decline in real food prices changed the agricultural market altogether. And likewise, the exchange value of the food grains, produced through the traditional methods which produced no more than the 'average' output also reduced. The 'expropriation' of the potential of capital formation from 'other' unattended food grains and their

producers was not as much State led as it was market-led. The production chains, which circulate surplus within the circuit, fed the capitalist farmers, who went on to gain more through rice-wheat duopoly production.

This effect of mechanisation, which no doubt enables mass production can be read along with the phenomena which Marx (1887) studied of the handloom weavers gradually being replaced by power loom weavers due to no quick commodity creation in lesser 'socially necessary labour time'. The price mechanism, due to these commodities further affected the labourer and his labour power. The greatness of a nation's wealth or man's wealth is determined by its 'relative magnitude of the surplus-produce' and not by the production of absolute quantity. The labourer under the influence of capital, works no more with the manual tools but with a machine handling the tools on its own. The key instruments of labour of Modern Industry, machines and systems of machinery transfer value to the product, which is different from the value of the machine itself. The lesser labour it employs, lesser is the value imparted to the product. The value of the same commodity produced by manufactures and machinery on

the other hand varies. The value of the product, assembled by machinery due to the instruments of labour, increases in relative terms but decreases absolutely.

Due to the 'revolutionised' production, the decrease in prices of rice further decreased the real wages too. (Bardhan, 1970) Further the effects of annihilating the peasants, which were replaced by wage labourers, were seen profoundly destructive and continued to the monopolisation by 'market drivers' of the capital generating crop itself. The petrochemical industries, which benefited due to the fertilizer intensive programmes across the world gave avenues for research in the Indian food market. These industrial-agricultural pathways or the agricultural research-market pathways continue to be major influences or 'sites' of origin of new food policies. The influential absorption of wheat and rice by the market created value within the production chains wherein industries work in-tandem to compete for the best returns. Under the influence of capital the agricultural production, much like manufacturing, resulted in "the martyrdom of producer" wherein the instruments of labour were modified to be the means of slavery,

exploitation and impoverishment of the labourer.

The instruments of production, and particularly the technological changes, then conceal more than what it can reveal in the political-economic order, which engages the oppressed and the exploited. "The concealing of technology could be the ideological bias or intentions of its promoters or protagonists which is more often concealed than revealed in social theories and analysis of technological change". (Parayil, 1998, 17) While the adoption of new technologies or machinery cannot be criticised for their quick resolution to long standing problems like hunger and food shortage, the specificity of employing to particular sectors produces bigger questions. These motivating forces conceal the agendas of market operators, or the farmers operating to generate greater surplus.

Marx(1887), elaborating not only on the labour market but also the ecological disaster, writes that further advancements in capitalist agriculture are a gradual progress in the art of robbing. The soil along with the labourer is robbed of its natural capacities and further attempts in increasing the soil fertility for a specific period, is an



advancement towards destroying the long-term sources of that fertility. This process of destruction takes on newer forms as the country goes on to develop more on the foundation of the modern industry. The agent enabling the destruction, the capitalist, engages more profoundly in this capitalist production. This happens by bringing together the multiple processes into a social whole, possible only through depleting the two primary sources of all wealth, namely the soil and the labourer.

This Indian food revolution, which was divisive in terms of the producers as with the 'crop produce' was pronounced as "a small 'palace revolt'" (Abel, 1970) due to the replenishment and growth of surplus to some industries and regions in a unilinear fashion. Marx (1887) wrote of the three key constituents of a fully developed machinery, the motor mechanism, the transmitting mechanism, and finally the tool or working machine. The motor mechanism is responsible for its motion, either through its own motive power or through natural force. The transmitting mechanism is responsible for the regulation of motion. The combined working of these two is ultimately handled by the third part which becomes the most significant. The beginnings of the industrial

revolution of eighteenth century can be traced through this tool or working machine. It continues to serve as the starting point whenever a handicraft is turned into an industry, or when a manufacture is undertaken by machinery. The man in the course of production, does not work with an instrument on the subject of his labour, but ceases to be simply the motive power of an implement-machine. It is merely an accident that this motive power takes the disguise of human form, while it may be equally replaced by natural forces like wind, water or steam.

These kinds of shifts in the labour market characterised the 'New Agriculture strategy' which had "inherent tendency to give rise to 'enclave' economies within India" (Parayil, 1998) The Nobel laureate, Norman E. Borlaug or "the father of the Green Revolution" contributed massively in producing literature on the ecological modifications and interactions with the socio-economic conditions. He stated that the expansive powers of Green revolutions around the globe have its origin in the First World War. The large-scale expansion of the fertilizer industries attracted the countries involved in the First World War as ammonia was a significant constituent in producing

nitrate for explosives. After the 'Great Depression' of the 1930s, the trend of increased demand for warfare explosives was seen during the Second World War. With the War ending officially in 1949, what left were excessive amounts of nitrogen, which were both, freely available and increasing at a great rate. Consequently, the low-cost nitrogen was extracted from synthetic ammonia which helped in increased crop yields and production.

The requirement by farmers have moreover remained same, increased productivity and profitability though cost-effective input delivery, renewed technological innovations, well planned market linkages and value addition. In the recent years, Rabi sorghum even though has high nutrition benefits, failed to make inroads even with research and development contributions enhancing productivity. This is an indicator that productivity delivers to only the supply side, while consumer demand still continues to take a backseat. The major pulse crops grown in India, namely chickpea, lentil, urdbean, mungbean and pigeon pea continue to be the central component of Indian agricultural income. Even though India accounts for 32% global area under pulses, the present productivity level is low and has

also remained static for the past several years. With the rise of nutrition consciousness among the population, the needs of the 'demand side,' the purchasers, are being adhered to but nevertheless, the ethos of surplus generating capitalism, as had been written by Marx, survives.

## **CONCLUSION**

This paper attempted to theoretically understand the Indian experience of Green revolution, which contested two interrelated goals in a polar fashion: Food security and Nutrition security. The lack of diversified food market, which fixed its gaze on mainly two crops, wheat and rice was looked at through the Marxian lens. The capitalist accumulation and surplus generation, occurring within the production chains was not so much a product of the State, but the market, and appeared to have a 'will of its own'. The intentions of the agricultural capitalists interlaced with the workings of industrial capitalists were observed carefully through the examples of petrochemical and fertilizer industries. The already changing agrarian relations in the post-independent scenario were further modified due to the inclusion of machinery and mechanical changes. The effects on agricultural labourer and a declined value in the market for their

product, due to the availability of high yielding varieties was studied. Agricultural scientists continue to write on the Indian farming sector, which till the present times remains plagued with “wheat-rice duopoly”. (Chopra, 2018) These production chains must not remain crippled with monopolization of food grains, and should effectively be diversified by including other crops and producing nutri-cereals.

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