

**BACKGROUND NOTES FOR AND ISSUES DISCUSSED IN THE FIRST MEETING  
OF WORKING GROUP ON AGRICULTURE PRODUCTION**

**I. Bridging yield gaps**

1. Agriculture production of essential commodities can be increased by adopting a two-pronged strategy to deal with gaps in production and productivity. First, there exist significant gaps between yields in research conditions, yields demonstrated on farmers' fields under frontline and other demonstrations and yields as obtained from the farmers fields (vertical gaps). There are also significant gaps in yields in different states and also between districts of same state (horizontal gap). These yield gaps can be closed. Second, considerable land, especially in the eastern part of the country, is sown only once, despite a very favourable water regime. These lands can be double or even triple cropped with appropriate investments.
2. The gap in potential and real yields (vertical gap) is quite significant. For example, in case of wheat, gap in yields under Research conditions (4.20 tonnes per hectare), yields Demonstrated on farmers' fields (3.32 tonnes per hectare) and Actual average yields (2.79 tonne per hectare) is 26.5% between Research and Demonstrated yields and 19% between Demonstrated yields and Actual yields. Much larger gaps exist in case of Bihar and Madhya Pradesh. Reasons for this gap need to be ascertained through by specific studies and addressed by appropriate interventions.
3. Similarly, there are wide variations in Inter-State/inter-District productivity (horizontal gap). For instance, the productivity of rice and wheat in Trans- Gangetic region has been more than 3 tons per ha and 4 tons per ha, respectively, against 2 to 2.5 tons per ha in lower and mid-Gangetic plains (Eastern Uttar Pradesh and Bihar). In case of wheat, the inter-State variation in productivity is more conspicuous ranging from as low as 1406 kg/ha in Maharashtra to as high as 4265 kg/ ha in Punjab. Similarly, in rice, the inter-State variation ranges from 1233 kg/ ha in Bihar to 3876 kg/ ha in Punjab. In case of pulses, productivity ranges from 418 kg/ha in Orissa and Karnataka to more than 800 kg/ha in Uttar Pradesh. Similarly, inter-District variations in productivity are also prominent within States. It is imperative to target low productivity States/Districts to bridge yield gaps and enhance productivity to meet our food requirements.
4. Large agriculture tracts in eastern India (in the states of Assam, Bengal, Bihar, Orissa, Jharkhand, Chhatisgarh and UP) remain unsown in rabi. This is despite the fact that water regime of the region is very good. There is need for lifting ground water for irrigation in Rabi. Ground water is not very deep in these regions and is in abundance. A large time

bound programme of ground water exploitation by bore-wells, shallow wells and lift irrigation schemes needs to be taken up in this region. For operating these wells, power is required. Eastern region has immense potential for power generation. Further, power distribution system needs to be strengthened to provide power to these wells. Operating wells through diesel generating sets is also relatively much cheaper in comparison to States where water has to be lifted from much more depth. Therefore, diesel pump-sets programme needs to be taken up at a fast clip.

5. Challenge of raising productivity of crops in areas like Punjab and Haryana, which have largely exploited their water endowment, is to sustain and increase productivity with lesser water. This can be achieved by developing varieties which require lesser water, adopting agronomic practices which increase water use efficiency and diversifying to crops which require less water. Additionally, investments are required in maintaining canals and developing conjunctive use of ground water.
6. In order to extend green revolution to West Bengal, Orissa, Jharkhand, Bihar, Eastern UP and Chhattisgarh, an amount of Rs. 400 crores has been allocated under the Rashtriya Krishi Vikas Yojana. This should kick-start a major programme of harnessing and developing water resources of the eastern states for raising production of crops. Situation in Assam is quite similar to Bihar and other eastern states identified for this initiative. Assam should also be included in this initiative.
7. Rainfed areas need to be developed through integrated water management and *in-situ/ ex-situ* harvesting of rainwater. At present hardly 29 % of the total rainwater is utilized. There exists scope for harvesting, storing and recycling of water to improve production. Common guidelines developed for converging the efforts of different schemes and agencies by the recently established National Rainfed Area Authority need to be adopted for ensuring that watersheds are developed and utilized in the manner designed.
8. Experience of Andhra Pradesh in substantially raising crop yields and incomes in rain deficient areas by adopting water management practices synchronous with adoption of crop choices and farming practices which lead to fullest utilisation of water available for raising crops of higher value need to be adopted by all other States with rain-fed areas. These water and crop management practices combined with adoption of bio-pesticides, use of bio-fertilisers and avoidance of pesticides and fertilisers to the extent possible, has not only raised production and productivity in lakhs of hectares in the state, but has also contributed significantly to raising incomes of small and marginal farmers. Andhra model is worth emulating in other states.
9. Water use efficiency through sprinklers and drips under the Micro Irrigation scheme would ensure more crop per drop of water. Multiple use of limited water for multi enterprise

agriculture will provide much needed livelihood security to small farmers. Micro Irrigation Scheme is being revised to provide higher subsidies. Penetration of these micro-irrigation devices is very low in our country. There is need to take up this programme, not only for horticulture crops, but for many field crops as well in a national campaign mode. Gujarat model can be a successful way forward for many States.

10. Micro-irrigation can be combined with controlled application of fertilisers and other needed nutrients. Liquid fertiliser is needed for this purpose. Tamilnadu has done considerable work in raising production and productivity by combining micro-irrigation with liquid fertiliser application in what is known as 'precision farming'. Our country still does not produce liquid fertilisers. Moreover, import of liquid fertiliser, not only is not eligible for subsidies otherwise available for fertilisers, but is subjected to import duties. Accordingly, imported liquid fertilisers should not only be freed from import duties, but should also be made eligible for subsidies in line with newly introduced nutrient based subsidy scheme.
11. As per the recent estimates of ICAR, nearly 120 m ha area is degraded/ wasteland. Reclamation of wastelands by treating saline, alkaline and acidic soil has tremendous potential for increasing area under cultivation. ICAR institutes have developed sustainable and eco-friendly technologies to reclaim wastelands for growing crops. States may take initiatives in collaboration with ICAR Institutes / SAUs to reclaim wastelands during the next 5-10 years.
12. Nearly 90 million ha area in the country is subject to water erosion. Along with water, fertile productive soil is also carried away and gets deposited in reservoirs downstream resulting in reduction in water storage capacity. Considerable sums of money are used every year for desilting of such reservoirs. Soil and water erosion is extremely serious in the foothills of Himalayas covering the States of West Bengal, Bihar, U.P., Haryana, Punjab, Himachal Pradesh and Jammu & Kashmir. There is a need to formulate appropriate policy and programmes to bring all foothill areas under perennial cover of horticulture, forestry and fodder grasses. The establishment of such tree based systems in foothill areas will provide much needed soil and water conservation options and help recharge of ground water in situ and downstream.
13. Nearly 50 per cent of the farmers in India have landholdings of less than 1 ha. Individual crop / produce based approach does not provide livelihood security to small and marginal farmers. There is need to develop and upscale integrated agriculture including crops, fisheries, horticulture, dairying, mushroom, poultry and vermi composting etc. to generate regular income, employment and livelihood security in small farm holdings. Integration of gobar gas plants and solar heating can meet the energy requirements for cooling, lighting and running IHP motors. These integrated farming system models will also provide much needed insurance against climate change related risks.

14. A sizeable area in Bihar is constituted by the Tal areas. These Tals get refilled with water during monsoon because of overflow of Ganga and its tributaries. Water up to 8 ft depth remains trapped for 3-4 months in a sizeable area in the tals. When the water level in the river decreases, the trapped water starts flowing back, but the process of draining out is much slower than the filling process. Generally, the fields become cultivable only by November- December each year. There is a need to develop strategies for water management in these areas for aquaculture based systems during Kharif and crops in rabi.
15. A National Mission for Sustainable Agriculture (NMSA) as part of the National Action Plan on Climate Change is on the anvil to address issues regarding the impact of climate change on the agriculture sector. ICAR is focusing attention on research and development to adapt to climate change, with specific reference to the erratic behaviour of the monsoons, temperature & weather patterns observed in recent years. Keeping in view the need for optimal utilization of scarce resources to ensure the sustainability of agriculture, the budget for 2010-11 provides Rs. 200 crores to ICAR for a climate resilient agriculture initiative to promote 'conservation farming' involving concurrent attention to soil health, water conservation and preservation of bio diversity. In order to de-risk Indian agriculture from production and productivity losses on account of change in climate, ICAR should expeditiously complete the research project on climate resilient agriculture working closely with States. Ministry of Agriculture should also expedite launching of NMSA.
16. The emphasis in agriculture research is shifting towards biotechnology to cope with biotic and abiotic stresses for developing new varieties to break yield barriers, improving quality etc. Compared to conventional approaches, biotechnology is more capital and resource intensive. This necessitates much higher allocation of resources for research infrastructure. However, most of the State Agriculture Universities are inadequately funded even for conventional Research and Development. This would impede generation of new and improved technology in agriculture.
17. Despite efforts to reduce variability in agriculture production, there would always be some contingent events, sometimes at very grave scales, which needs to be dealt with promptly. It is therefore necessary to create a contingency fund to meet expenditure on handling such contingent events. It will be advisable to have a Fund for Unforeseeable Events to be administered by a governing body under Agriculture Ministry. In the short run, 5% of RKVY allocations can be set aside in the first six months of the year for meeting such unforeseen events. In case such a contingency does not occur by September, the funds can be transferred to the States for use in proportion to their RKVY entitlements.
18. Crop residues like those of rice and wheat are still burnt in Punjab, Haryana and Western U.P and are a cause of environment and soil degradation. These residues, if properly baled, collected and fortified, can meet much needed requirement of dry fodder during drought. Surplus States may also tie-up with States experiencing frequent droughts to create fodder

banks for use during scarcity periods. Low water requiring trees, shrubs and bushes having food and forage value provide much needed alternate livelihood security during drought. Trees of genus prosops is, natural to Rajasthan, provide livelihood security to both human beings and animals during severe droughts. These trees continue to grow green leaves during drought. There are number of other species like edible cactus (Opuntia ficus Indica) which serve as alternate food and fodder source during low rainfall years / situations. Such perennial trees, shrubs and bushes need to be promoted in all drought prone areas as a strategy for drought proofing.

19. There is need to reform the process for collection of agriculture related statistics to correctly reflect the crop area, crop health and crop production. Apart from better coordination between Agriculture and Revenue Departments, it is necessary to use scientific inputs, particularly remote sensing techniques/data for better assessment of crop area, crop health and crop production. There is need to develop system of recording crop data for horticultural crops as well. Entire statistical system needs to be revamped to cover all crops, increase accuracy of data collection by conducting crop cutting at panchayat level, increasing sample size to make it more robust, timeliness for estimation at sowing stage, development stage and harvesting stage, and dependability in terms of accuracy and elimination of higher or lower bias.
20. Besides revamping statistical systems for collecting crop data, it is essential to collect data relating to weather parameters and monitor the same for taking corrective action. Tamilnadu has created infrastructure for collecting weather related data at block level. Karnataka is developing a more ambitious system of collecting seven weather parameters at sub-block level. A national system of collecting and monitoring identified weather parameters should be developed and put in place using RKVY and other funds.
21. Government of India has taken up Rastriya Krishi Vikas Yojana (RKVY) as a major vehicle for channelizing support to States in agriculture and allied sector. Assistance under RKVY is sizeable and assistance under other Centrally Sponsored Schemes (CSSs) is also likely to move towards being subsumed in RKVY. In this context and also to focus States' attention on estimating their total investment requirement, it will be advisable if the states can draw up a programme of investment for the 12<sup>th</sup> plan period and then assess their total investment requirement. This exercise can be done as part of revamped State Agriculture Plan under RKVY. GOI and the States can then work out how much of such investments can be funded by GOI from RKVY.
22. In order to assist States like Bihar, West Bengal and Assam to promote programme of bringing additional area under crops by sinking in massive number of shallow tube wells, it is necessary to deal with question of energy availability. As electric power is unlikely to be available to the extent required, it is necessary to assist farmers partly in meeting higher

cost of diesel pumping sets. A scheme on the lines of Diesel Subsidy Scheme of Bihar can be thought about.

23. Ministry of Agriculture has rationalised plethora of centrally sponsored schemes in the sector by first undertaking a major consolidation exercise in the form of Macro Management of Agriculture Scheme and later bringing ACA scheme of RKVY. There are still quite a few CSS left in the Agriculture, and more so in the animal husbandry sector. It is recommended that a further consolidation exercise should be taken up to convert existing CSS into a few very focussed schemes.

## **II. Crop specific strategies- special focus on pulses and oilseeds**

24. Wheat is the major Rabi crop accounting for nearly 72% of total foodgrain production in the country. Although production of wheat has risen to an all time record level of around 81 million tonnes, productivity of wheat seem to be plateauing. There are inter-state variations also. For addressing low wheat productivity and also to arrest plateauing of yields, district-wise planning with emphasis on increase in area and productivity in eastern and southern states will be required. Timely sowing of wheat, balanced use of fertilizers as per soil tests with increased use of organic manures and bio-fertilizers, and propagation of use of soil ameliorants like gypsum in soils with high pH, lime in low pH and the use of micronutrients in deficient areas will need to be ensured. Water management in wheat is quite important. In this regard, underground pipeline systems (UGPL) in Haryana are a success. This system improves water use efficiency and yield by 5%. Similarly, micro irrigation systems need to be promoted in a big way. Further, promotion of zero till seed drills, seed-cum-fertilizers drills, straw reaper, straw binder, raised bed planter, rotavators and diesel pump sets, integrated weed management for the control of phalaris minor involving cultural and mechanical measures together with need based use of herbicides and integrated disease management especially for karnal bunt, loose smut and rust will be required. The States of Punjab & Haryana should phase out older varieties like PBW-343 and PBW-502 which have become susceptible to rust disease with resistant varieties like DBW-17 WH-711, WH-542 and PBW-550 possessing high yield potential.
25. Rice is the main food grain crop of the country. This is grown both in Kharif and Rabi season. Production of rice during Kharif season mainly depends on monsoon rains. Like wheat, there exists a wide variation in inter-state/inter-district productivity across States/Districts. To enhance the production and productivity of rice, National Food Security Mission has been started in selected districts in the country from the year 2007-08. For increasing the productivity of rice in different states, expansion of area under rice by increasing cropping intensity especially in the states of Assam, Bihar, Chhattisgarh, Orissa, Eastern UP and West Bengal should be the principal strategy. Adoption of short duration/location specific varieties/hybrids, supported by improved package of practices, can enhance yields. Development of minor irrigation in Eastern India by using ground

water, amelioration of soil with lime application in acidic soils especially in Assam, Bihar and Jharkhand, promotion of cultivation of hybrid rice (since hybrid rice yields 20% higher than the conventional rice varieties) promotion of farm mechanization particularly cono weeder for weeding in rice., and adoption of system of rice intensification (SRI) in identified districts under upland conditions with assured irrigation facilities are the principal interventions required.

26. Rabi/summer rice accounts for about 12% of total rabi foodgrain production in the country. Rabi/summer/boro rice in States of Andhra Pradesh, West Bengal, Tamil Nadu, Orissa, Karnataka, Assam, Bihar, Maharashtra and Kerala needs to expand. Average productivity of rabi/summer rice is about 3147 kg/ha. (2007-08). However, in States like Assam and Bihar, yield level is below 2 tonnes/ha. For increasing the productivity and production of rabi/summer rice, nurseries should be raised near lift irrigation points and other water sources in the middle of December and available ground and surface water should be utilized more efficiently.
27. Pulses and oilseeds present the biggest challenges to India. Domestic production is short by about 25% for pulses and about 50% for oilseeds in comparison to consumption demands. These two commodity groups cost the country over Rs. 30000 crore in imports during 2008-09. Moreover, sharp increase in prices of pulses during 2009-10 led to major consumer distress. We need to find solutions for enhancing production and availability of pulses and oilseeds.
28. Pulses are a very important source of protein which is crucial for our diet. Pulse crop is also important in the cropping system to improve soil health. Water and nutrient requirement of pulse crop is also very low. National pulses productivity is very low at 655 kg per ha. Several initiatives have been taken to focus on enhancing domestic production of pulses. Jharkhand and Assam States have been included in the Mission for pulses crops to realize the potential of area expansion in the rice fallows. All districts of States under pulses programme have been included under National Food Security Mission to give more focus to pulses production program in the remaining two years of the eleventh five year plan. More components have been added for pulses promotion by inclusion of ISOPOM (Pulses) under NFSM. It has been decided to take up 'Accelerated Pulses Production Program' in the form of large scale block demonstrations of technology on five major pulses crops – tur/arhar, moong, urad, masoor and chana. 1000 units of 1000 hectares each are planned for implementation from the coming Kharif season. It has also been decided to organize 60000 pulses and oilseeds villages in rain-fed areas to enhance productivity in dry land farming areas. An amount of Rs. 300 crores has been allocated for this initiative. All these initiatives need to be implemented in a mission mode by the States.
29. It has been decided to organize 60,000 pulses and oilseeds villages in the rain-fed areas for integrated water management and dry land crop production. An amount of Rs. 300 crores

has been allocated for this initiative. This amount could be used to supplement the ongoing schemes of NFSM/ISOPOM by taking up watershed plus activities in the form of land development activities like ridge furrows planting, cross furrows etc. It has been decided in consultation with major oilseeds/ pulses producing states that large scale mechanisation will be introduced in 60000 villages so identified by developing 6000 customs hiring centres on a hub and spoke model. These centres will be managed by societies/ SHGs and other agri-business organisations to provide services of tractors, rotavators, seed drills etc. to farmers on modest hiring charges to cover operational expenses. States may implement this initiative to raise production and productivity of pulses and oilseeds.

30. Genetic breakthrough in pulse crops is required for quantum jump in production. High yielding and disease resistant varieties of pulse crop should be developed in a time bound manner. The prevailing varieties of pulse crop are poor yielders and vulnerable to biotic and abiotic stresses. ICAR should collaborate with ICRISAT for time bound development of suitable cultivars. Arhar is one of the main pulse crops of the country but all the varieties are very old, tall, long duration and poor yielders and is not fit well in the crop rotation cycle, Plant protection measures are difficult to adopt because of tallness of the plants. Dwarf high yielding short duration varieties of arhar are urgently required. Efforts should be made to bring more area under pulse crop, especially in rice fallows and by way of inter-cropping. Suitable crop practices for this purpose need to be developed. Jharkhand and Assam have good potential for increasing area of pulse crop in the rice fallows. Farmers hesitate to cultivate pulse crop because of poor returns. There is need to make pulse crop economical and profitable to the farmers by giving remunerative prices to the farmers. Sprinkler irrigation and underground pipeline systems should be adopted to improve water use efficiency and productivity of pulse crop.
31. Consumption of vegetable oils is increasing steadily over the years. The country has to spend huge amount of money to import vegetable oils for domestic requirement. The requirement of vegetable oils may reach 21.8 million tons by 2020. Huge potential exists to increase vegetable oil seeds production. There is wide inter-state variation in the productivity of oilseeds. For increasing oilseed production, management practices should be location specific, variety specific and farmer specific. Informal seed sector must be strengthened to meet the huge demand for quality seed of groundnut and other oilseed crops. There is urgent need to improve the seed replacement rate of oilseed crops. Rapeseed-mustard is the premier winter oilseed crop in India. CMS – based hybrids have now been commercialized and these promise substantial productivity enhancement. Superior sunflower hybrid and open pollinated sunflower varieties should be developed. Breeding research should be addressed to geographical and regional requirements. A breakthrough in breeding for resistance to phylody will have the most significant effect on sesame yields. In castor, special focus is required for the development of hybrids and varieties resistant to abiotic stresses i.e. drought, salinity and highly stable and diverse pistillate lines. Rice bran is good source of quality oil but this source has not been fully

tapped. From the production of 141 million tonnes of paddy during 2007-08, only 7.00 lakh tonnes of rice bran oil was extracted, although there was a potential of 14 lakh tonnes. Therefore, steps for tapping remaining 40-50% of bran oil should be taken up. India is endowed with severe oilseeds of tree origin like sal, mahua, simarouba etc., which can be collected and crushed for vegetable oil. Research efforts should be directed towards identification of superior clones/genotypes for producing better quality and quantity of oil, high seed yield and possessing synchronized maturity. To make oilseed crop economically viable and competitive, remunerative prices should be given to the farmers and guaranteed procurement as in case of wheat and rice should be ensured.

32. Minimum support price of food and other crops has been significantly increased over the years to provide remunerative prices to farmers. Farmers have responded to these measures by recording highest ever production of about 235 million tons of food grains in 2008-09 resulting in record procurement of food grains. Government should consider introducing Economic and Remunerative Price (ERP) scheme for pulses and oilseeds to make it attractive for farmers to grow oilseeds and pulses. ERP can be fixed taking into consideration import parity price or opportunity cost of not growing alternative crops. This will incentivise farmers to switch over to oilseeds and pulses production.
33. Many countries have shopped for land abroad for growing crops to meet consumption demand in their countries. Indian companies can be encouraged to buy lands in countries like Canada, Myanmar, Australia and Argentina for producing pulses under long term supply contracts to Indian canalizing agencies. Similarly, such arrangements can be arranged in ASEAN countries for securing oilseeds supply. When these arrangements are being tried for crude oil, they would also be considered for food crops. Alternative arrangements like entering into long term supply contracts with farmers' organizations in these countries or trading companies should also be considered. We should seriously consider these options for at least 2 million tonnes of pulses and 5 million tonnes of edible oil for 15-20 years.

### **III. Strengthening input delivery mechanism for seeds, nutrients, water, credit, power**

34. Various aspects of agriculture development are being handled in different Departments and Ministries at the Centre and in the States. There is need to create a coordinating mechanism for Ministries of Agriculture, Rural Development, Food and Public Distribution, Irrigation, Fertilisers and Power in the Central Government. A Cabinet Committee on Agriculture should be created under the Chairmanship of Prime Minister with Ministers of all these Ministries to give focused attention to coordinated development and implementation of programmes of agriculture development.
35. At the State level also, various aspects of agriculture development are handled in different departments like Irrigation, Energy, Institutional Finance, Cooperation, Rural

Development, Science & Technology etc. There are now separate departments for crops, horticulture crops, agriculture marketing, animal husbandry, fisheries, soil conservation and watershed development. Similar disjointed machinery exists at district level. States may consider bringing all agriculture and allied sector production department under an Agriculture Production Commissioner, as was the system till some time back. For coordinating with other allied departments, Chief Secretaries will have to take increased interest. A coordinating mechanism under chairmanship of an Additional Chief Secretary level officer should be entrusted with this responsibility. In districts, collectors have to be entrusted with this responsibility in order to facilitate smooth delivery of services to the farmers.

36. National Seed Plan (NSP) projected seed requirement of 253.99 lakh quintals for 2009-10 against which production of 280 lakh quintal has been achieved. Still, as much as 70% of seed used by farmers continues to be farm saved. States should accord the highest priority to enhanced seed production and ensure adequate supply of quality seeds at reasonable prices and at the right time to meet the objective of food and nutritional security.
37. For achieving desirable levels of SRR, adequate seed needs to be produced first. Seed production programme should be organised in each State under a comprehensive and integrated State Seed Plan appropriate to regional and specific requirements. States should ensure production, multiplication and replacement of seed to increase SMR and SRR progressively, particularly in respect of regionally important crops/varieties. Extending production of seed to agro-climatic zones outside the traditional seed growing areas and avoiding un-remunerative seed farming in unsuitable areas need attention.
38. Special attention should be given to upgrade the quality of farm saved seeds through governmental interventions including seed treatment.
39. The drought of Kharif 2009 has re-emphasised the necessity for contingency planning to meet the demand for seeds during natural calamities by banking seed of appropriate varieties/crops. There is a need to develop seed reserves of drought resistant varieties and early growing varieties in flood conditions. Such reserves can help in re-sowing in times of droughts or floods when sown seeds have withered / been washed away and some time is still available for re-sowing.
40. Re-structuring and streamlining the public sector seed producing undertakings is required for product diversification/ upgradation and for improving their governance, core competence and competitiveness. Issues of undesirable equity/Board structure, poor degree of professional management and heavy work over-load need particular consideration. Several of the 15 State Seed Corporations are either sick or close to sickness. State Seed Corporations should either be reformed to make them vibrant organizations or should be closed to allow alternative mechanisms to grow.

41. State seed farms, though substantial capital assets and an important links in efficient multiplication of seeds, require urgent attention and investment as several of them are in a state of dis-use and neglect. An approach for making most optimal use of state seed farms is to promote partnership of state farms and farmers to produce certified seeds. While state farms can procure breeder/ foundation seed and provide the land (with water and power connection), actual seed multiplication actual farming can be entrusted to farmers under contractual arrangements with assured price and purchase. Farmers could be selected under a bidding arrangement on annual basis or a short period of two to three years. This will enhance productivity of state seed farms manifold without forcing the state farms management to produce with temporarily or casually employed farming hands.
42. Complementarity and synergy between the public sector policy and resource and private sector dynamism and enterprise can be maximized through appropriate Public Private Partnerships (PPP) models and higher support to the private sector. Again, long term contracts can be entered into between state seed corporations and private corporate/ cooperatives of farmers or SHGs of farmers to undertake production and supply of seeds.
43. Seed quality assurance requires considerable investment in appropriate infrastructure, equipment and most importantly in human resource. Quality enforcement suffers acutely from lack of adequate and trained manpower in the States. Seed certification agencies have to be adequately equipped for this purpose. Contract seed certification programmes are the way forward.
44. Adequate infrastructure for seed processing is still to be created in some States. Seed processing facilities should be created in the state seed corporations, agriculture universities and private seed agencies. RKVY funds can be availed to provide assistance upto 50% of the cost of seed godowns and seed processing facilities. State should take up programme to establish adequate seed processing infrastructure in a period of three years. Some states may still find it difficult to do so. National Seed Corporation (NSC) and State Seed Farms Corporation (SFFC) may be provided assistance under RKVY to establish seed processing facilities on similar terms in these States. Private Sector Companies can also be encouraged to do so in such States.
45. India has the potential to become one of the foremost players in the seed export business in the developing world; but its present share in global seed exports is less than 2%. Specific interventions to boost exports particularly through development of important hubs for production and trade in seeds need consideration.
46. Concerted efforts are required for popularization of new/quality seeds for the benefit of the farming community through vigorous and sustained campaigns. Seed subsidies should be

rationalised so as to act as an incentive for seed and varietal replacement but discourage wastage and diversion for non-seed purposes.

47. The enactment of the Seeds Bill, 2004 is long awaited. Department of Agriculture and Co-operation, Government of India should take all necessary steps to expedite enactment of the Seeds Bill 2004 during 2010. Necessary action for implementation of the Seeds Bill also needs to be initiated in time particularly for compulsory registration of all seeds and provisions related to seed health and compensation to farmers for failed seed.
48. Considering the importance of seeds, Government of India is in the process of launching a Mission on Seeds. Required clearances should be obtained/ provided expeditiously to ensure that Mission on Seeds is launched during the current financial year.
49. Average fertilizer consumption per hectare increased by 46% between 2004-05 to 2008-09, but productivity of foodgrains grew only by 10% during the same period. This underlines the decline in marginal productivity of soil in relation to application of fertilizers. More increase is noticeable in application of urea leading to imbalanced use of fertilisers. Government has introduced a Nutrient Based Subsidy Policy with effect from 01.04.2010. Subsidy has also been introduced on micronutrients like Boron and Zinc. Introduction of nutrient based subsidy scheme should incentivise formulation and introduction of new products, including fertilizers fortified with micronutrients and crop and location specific customized fertilizers. Promotion of integrated nutrient management has to be encouraged involving judicious use of chemical fertilizers, bio-fertilizers and locally available organic manures like farmyard manure, vermi-compost and green manure to maintain soil health and its productivity.
50. To make farmers aware of what is the nutrient status of the soils of their farms and to encourage them to buy right kind of nutrients mix in fertiliser, it is necessary to promote soil testing, including testing for secondary and micro- nutrients. For this, country needs adequate infrastructure of soil and nutrient testing laboratories and to issue soil health cards to all farmers. Resources under the National Project on Management of Soil Health & Fertility as well as the Rashtriya Krishi Vikas Yojana administered by Department of Agriculture & Cooperation (DAC) should be availed to put in place this infrastructure. A common problem encountered by the States is lack of availability of trained technical manpower and restrictions on employment of such technical manpower. The services provided by these laboratories are in the nature of public goods. The States may therefore consider employing staff on permanent basis from their resources and use DAC scheme funds for creation of infrastructure.
51. Fertiliser companies can now produce the right kind of mixtures of nutrients to suit the specific requirements of soils in all agro-climatic zones provided they are informed of the aggregate demand of the type of mix required in specific areas. This is possible if soil

health maps are prepared. Soil testing on representative sample basis in all villages should help in preparation of soil health maps in a time bound manner. States may undertake this on a campaign mode to complete this exercise in a period of two years. Expenditure on collection of samples on representative basis and their testing can be paid from RKVY and other schemes of DAC. Fertiliser companies should also be associated with this campaign.

52. Fertiliser companies must undertake formulation and introduction of new products, including fertilizers fortified with micronutrients and crop and location specific customized fertilizers & get them included under the purview of the Fertilizer (Control) Order (FCO), 1985 in consultation with the Indian Council of Agricultural Research (ICAR). Besides production of right kind of nutrients mix fertilisers, fertilisers companies need to join in intensification of extension in nutrient management by State Governments.
53. Bio-fertilizers and locally available organic manures like farmyard manure, vermi-compost and green manure are rich sources of nutrients for soil. Their application must be encouraged to maintain soil health and its productivity. Integrated nutrient management involving judicious use of chemical fertilizers, bio-fertilisers and organic manure holds high promise for economical and productivity enhancement.
54. Various studies have brought out that efficiency of chemical fertilisers varies from area to area and crops to crops depending upon several factors. Research efforts to improve uptake efficiency of nitrogenous and phosphatic fertilizers in major crops needs to be intensified.
55. Our country is highly dependent on imported fertilisers. Besides ensuring availability of required quantum of fertilisers, it is extremely important to position it in right quantities at the right time at the places where it is required. A functional mechanism is required to ensure supply of fertilisers in accordance with month-wise supply plans as per assessed requirement by State Governments in coordination with the fertilizer companies and communication of any bottleneck in supply of fertilizers, including availability of railway rakes, to Department of Fertilisers, Department of Agriculture and M/o Railways on time.
56. Integrated Pest Management (IPM) approach, emphasising use of all available pest control methods and techniques such as cultural, mechanical and biological control and judicious use of chemical pesticides needs to be popularised. IPM should be popularized among the farmers through Farmers' Field Schools as is being done in Andhra Pradesh through 'Poolam Badis'.
57. There is need to strengthen regulatory framework for quality control and management of pesticides. The Pesticides Management Bill formulated by the Central Government to replace the existing Act needs to be enacted at the earliest. There is need to create appropriate pesticide quality control set up and provide deterrent punishment for sale of spurious pesticides.

58. There is need to create facilities for testing of pesticides and bio-pesticides. Funds available under RKVY and other schemes need to be used for building required infrastructure of pesticides testing laboratories. Simultaneously, accreditation of existing pesticide laboratories have to be taken up to strengthen quality control of pesticides.
59. In the light of climate change and associated shifts in temperature, rainfall and relative humidity in different regions, there could also be shifts in pattern of pests and diseases infestation. This calls for more vigorous monitoring /surveillance of pests and diseases in future to advise the farmers for initiating timely control / management measures. Agro-advisory services on weather based forewarning for pests and disease at the district level will be absolutely necessary. It is necessary to institutionalise a system of pest surveillance as the costs involved in doing so are far less than the losses such a system prevents. Maharashtra has developed an excellent pest surveillance system. This can be adopted by other States. Pest surveillance system should be technically strengthened including by use of GPS devices for accurate and quick reporting and for networking among Agriculture Departments, State Agricultural Universities and Central Government's Institutions.
60. Efficiency of surface water projects is estimated to be 35-40%, which can be increased up to 60% by adopting efficient management practices, proper maintenance and modernization of existing infrastructure, command area development, participatory irrigation management, and efficient irrigation and agricultural practices. Similarly, the efficiency of ground water facilities can be increased from the present level of about 65% to 75%. It is estimated that with 10% increase in water use efficiency, an additional 14 million hectares can be brought under irrigation from the existing irrigation capacity. There is tremendous need to take up upgradation of canal networks including lining of canals for preventing leakage of water, which also create problem of water logging. There is need to devise efficient water distribution systems and on farm development for better farm water use efficiency. Practice of flood irrigation has to be abandoned and replaced by better application of water. For this to happen, farmers need to be organised and management and operation of irrigation systems at distributor level needs to be handed over to farmers. Government can make investments for this purpose, based on cost of water saved and delivered for use elsewhere.
61. Command Area Development and adoption of better water management facilities will considerably help in fully utilizing the created potential and also in improving efficiency. Activities such as construction of micro-level structural works, land levelling and shaping, orientation of the farmers towards irrigated agriculture, etc. can be prioritized for achieving optimum utilization of water resources.

62. 2008 World Development Report emphasized that in order to meet future food demand, water productivity needs to be improved in irrigated as well as rain-fed areas. At the technology level, the key principles for improving water productivity are reduction of all outflows (eg. drainage, seepage and percolation) and increase in the effective use of water. New irrigation technologies that will improve field level water application efficiencies will be critical components of the demand-side management.
63. Water conservation in situ for its most optimal utilisation is the solution for stability and sustainability of agriculture, and improving yields of crops in the rain-fed areas of the country. Water conservation and harvesting structures like construction of farm ponds, drainage structures, water carrying pipelines and other micro irrigation works, rejuvenation of old dug wells and use of sprinklers and drips need to be made universal in entire rain-fed area of the country. MGNREGS provides large resources for water conservation works including provision of irrigation facility on land owned by households belonging to the Scheduled Castes and Scheduled Tribes, small and marginal farmers, beneficiaries of land reforms, beneficiaries under the Indira Awas Yojana and farmers who received waivers/ remission under farm loan waiver scheme. Water conservation and water harvesting works need to be taken up on a massive scale as a movement in the country.
64. Availability of fresh water for agriculture is likely to reduce from about 85% currently to about 75 % by 2025. Agriculture will have to depend upon reuse of sewage and industrial effluent water. There is a strong case to develop technologies for effective use of waste water in agriculture. Similarly, about 25% ground water used for irrigation is brackish and/ or saline. Continuous use of such water for irrigation is bound to increase salinity/ sodicity. Major efforts will be required to promote techniques / agronomic practices for safe use of such water in agriculture.
65. There is very little consciousness in the country about water productivity of crops. Water is one of the most critical inputs today for agriculture crops. Output per unit of water should be a critical criterion to determine appropriateness of adoption of any variety or technology. Varieties need to be evaluated for their water requirement. Farming practices should be compared and evaluated for their water requirement. Government must promote adoption of those varieties and farming practices where production can be maintained or increased with lesser consumption of water. Competitions should be organised amongst villages with determining criterion being use of less water for same productivity. Government should institute awards for recognising and rewarding such farmers.
66. There are no studies documenting water consumption per tonne of production in different crops in different parts of the country. Such studies need to be conducted not only to bridge inter-state, inter-block & inter-panchayat variations in similar conditions. These studies will show the way forward for increasing productivity of water.

67. An amount of Rs. 3,75,000 crores is targeted to be disbursed as credit to the farmers in 2010-11. This constitutes nearly 20% increase over credit disbursed in 2009-10. Apart from strengthening rural financial institutions, government has initiated several measures for greater financial inclusion. Major initiatives include promoting micro credit programs through liberal refinance support from NABARD; Kisan Credit Card scheme for making credit delivery simple and hassle free, and joint liability groups for extending credit to vulnerable sections of farmers like sharecroppers, oral lessees, etc. Since credit delivery is done at the disaggregated level, States are expected to involve themselves more actively to ensure availability of credit to all the farmers.
68. Flow of agriculture credit has not been uniform across States. Even within States, there are marked differences between credit flow to developed Districts and Districts closer to urban centres as compared to under-developed Districts. Institutional development across States is a priority area for equitable flow of credit.
69. State Governments may take appropriate measures for extending fresh credit to all farmers who have benefited under the Agricultural Debt Waiver and Debt Relief Scheme.
70. State Governments may launch an intensive branch/village level campaigns for activating dormant KCCs and provide KCCs to all willing and eligible farmers.
71. State Governments may work in close coordination with the banking system for promotion of more Joint Liability Groups (JLGs) as per NABARD guidelines to ensure that formal credit reaches financially excluded farmers i.e. small and marginal farmers, share croppers, tenant farmers etc. in a time bound manner.
72. State Governments should regularly monitor the position of credit flow and coverage of farmers within the institutional credit fold and submit monthly progress reports to the Department of Agriculture & Cooperation.
73. Farm mechanisation is not only necessary for increasing productivity, but has become essential in view of emerging labour shortage on account of expansion of employment programme and migration to urban areas. Farm mechanization saves time and labour, cuts down crop production costs, reduces post-harvest losses and boosts crop output and farm incomes. Empirical studies confirm that there is a strong correlation between farm mechanization and agricultural productivity. States where availability of farm power is more, generally have higher productivity as compared to others.
74. The increasing threat to natural resources, notably land and water, has further necessitated switching over to machine assisted resource-conservation techniques such as zero-tillage, raised-bed planting, precision farming, drip or sprinkler irrigation etc. Farm mechanization becomes more imperative when crop sowing schedules have to be readjusted on account of

erratic weather. The climate change-driven early onset of summers in the northern states has resulted in wheat yield dropping by 1.5 quintal per hectare with every one week's delay in planting after mid-November. This loss can be averted by sowing wheat early, which is possible only if the previous paddy crop is harvested mechanically and wheat is planted with zero-till seed drills that do not require ploughing of the land. Greater degree of farm mechanization would also address the issue of scarcity of farm labour during peak requirement at the time of sowing and harvesting.

75. We need to encourage establishment of agri-business centres by Self Help Group of farmers (SHGs), user groups, agri-preneurs, and cooperative societies to purchase, maintain and provide farm machinery to farmers under custom hiring arrangements. Funds earmarked for improving productivity in 60000 oilseeds and pulses villages have been decided to be used to establish custom hiring centres for farm equipments in 6000 villages, with the objective to service 60000 villages/ hamlets on hub and spoke basis. This will benefit small and marginal farmers by employing tillage and sowing equipment, micro irrigation systems and plant protection equipment. RKVY funds can also be used for taking up such projects in other areas.
76. A major research project and extension campaign to improve availability of efficient farm implements, especially gender friendly ones, needs to be taken up.
77. Farm Mechanization sector needs considerable support from Government through easy availability of technology and finance. The State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVK), Agri-clinics & Agribusiness Centres etc. are to be strengthened so that both demand and supply side issues are handled suitably.
78. The requirement of energy for agriculture is rapidly increasing on account of farmers switching over to increased use of energy operated implements and for energisation of wells for irrigation. Energy demand is expected to rise at a much higher pace in eastern India where lot of area currently remaining fallow in rabi is being brought under cultivation. The availability, efficiency and reach of electric power needs to be increased substantially. States may consider taking up segregation of feeders for dedicated availability of power to agriculture sector, efficiency improvement of existing pump-sets and making power available in un-served areas especially in eastern India. Additionally, solar, biomass and wind energy need to be harnessed for use in agriculture.
79. Energy demand is to be met mainly from electric power. Electric supply is often erratic, unscheduled, and with low voltage. This restricts exploitation of irrigation potential and adoption of efficient technologies like drip and sprinkler. More investments are required to ensure availability, efficiency and reach of electric power.

80. Free or highly subsidized fixed tariffs result in inefficient use of power which leads to indiscriminate use of scarce water resources with serious implications for future availability of water and sustainability of agricultural operations. Absence of user charges also constrains investments in power generation. Unless these issues are addressed, power supply to agriculture would remain inadequate.
81. Agriculture is season bound. All support services for agriculture have to be extended in time to enable farmers to achieve optimum crop production. It is, therefore, necessary for implementing agencies to get funds in time in order to be able to ensure timely delivery of inputs. Credible administrative arrangements need to be created and enforced to ensure that the funds meant for agriculture development are released to the implementing agencies at the cutting edge level in time.

#### **IV. Gearing up extension administration**

82. Knowledge and technology are critical inputs that can be ensured only through a vibrant extension machinery. Revised Scheme of Extension Reforms has been approved recently (March 2010). States are expected to quickly put in place the strengthened mechanism to provide requisite training and extension support to the farmers enabling them to enhance production and productivity.
83. States are requested to give wide publicity to Kisan Call Centres (a permissible activity under ATMA cafeteria) and also to frequently update web-based Kisan Knowledge Management System. Kisan Knowledge Management System is being modified to involve State Agriculture Departments in a big way across all tiers of hierarchy from Block to State level, while drawing technical inputs from Krishi Vigyan Kendras and State Agricultural Universities.
84. Technology development and dissemination is the key to ensure that newer and better varieties or package of practices are available to the farmers to achieve higher productivity levels. Higher investments, particularly in biotechnology, and a mechanism for fast tracking adoption of developed technologies would be needed, particularly in view of the likely impact of climate change on agriculture. It is also necessary to strengthen the technical and administrative capacity of the Extension machinery on account of the huge increase in budgetary allocations to the States.
85. A time bound program to fill up existing vacancies is called for so that the outreach programs could be implemented to the satisfaction of the farmers. Stability of tenure to the incumbents at various levels of agriculture administrative hierarchy will go a long way in improving accountability in the system.

86. State Agriculture Universities and ICAR institutes/ KVKs need to be actively involved for improving the planning and delivery of each component of various schemes to ensure that the recommended varieties and package of practices are implemented. Desired seed and variety replacement rates through promotion of quality seeds should be the priority for achieving higher productivity levels.
87. Various States have tried innovative extension approaches. Andhra Pradesh has evolved a system of providing extension services through women SHGs using farmers who have demonstrated abilities/ knowledge to provide advisory services to farmers. Karnataka has created extension systems at the sub-block level in form of farmers' organisations. Gujarat provides extension services through farmers' fairs before every Kharif. There are other innovative and productive practices in other parts of the countries as well. Considering the fact that it would be very costly to employ desired number of extension workers in the government, states need to evolve appropriate extension approaches using farmers. New Extension Scheme also encourages such kind of extension approach.
88. The public research needs to cater to the requirements of the farmers. Scientists in the public research system should be encouraged to work with farmers and evolve new varieties, machinery, farming practices and other methods to increase productivity. A system to incentivise such research needs to be put in place.
89. Public private partnership in extension system and outputs based contracting approach to bring in private sector in enhancing production and productivity should be encouraged.

## **V. Marketing Reforms**

90. It is surprising but true that farmers have hardly any choice in marketing their produce. Unlike other producers, farmers have to bring their produce to regulated agriculture mandis, which effectively means going to mandis near their farms/ villages. These regulated mandis virtually act as monopoly locations for sale of farm produce. In the absence of storage facilities to store produce in case farmers do not find the price acceptable and no system of availing credit against farm produce, farmers, especially small and marginal farmers, have no choice but to hand over their produce to traders either at their own farms or at the mandis. The market for sale of farm produce needs to be freed.
91. On account of the system of regulated mandis being in the hands of Government, private investment is not forthcoming for handling, storing, and transporting crops. In order to give choices to farmers and for developing more efficient supply chain, it is necessary to bring in private sector investments for developing marketing infrastructure including better handling of agriculture produce.

92. Ministry of Agriculture had circulated a Model Agricultural Marketing Law in 2003 for adoption by the States. The Model Act provides for alternative marketing channels to the farmers. Major features of the model APMC Act is establishment of private markets and farmers–consumer markets, facilitating contract farming and direct marketing, single point levy of market fees/ cess, setting up special commodity markets, promotion of standardization and grading and promotion of e-trading. States need to adopt these reforms, operationalise them and in fact go beyond the measures proposed in the Model Law to provide a free and competitive market to farmers.
93. A Committee of State Ministers for Agri-Marketing has been constituted to promote market reforms and to recommend development of barrier free National Market. Uttar Pradesh, Uttarakhand, J&K, West Bengal, Meghalaya, Mizoram and Puducherry are still to amend their State APMC Act as per Model Act 2003. Punjab, Haryana, UT of Chandigarh and NCT of Delhi have only done partial amendments to their APMC Act as per Model Act. Maharashtra, Andhra Pradesh, Rajasthan, Tamil Nadu, Orissa, Himachal Pradesh, and Karnataka have framed APMC Rules as per model APMC Rules 2007. Others are still to notify their Rules.
94. System of spot electronic markets is one of the biggest institutional reforms which is necessary to be carried out in agriculture marketing system. This system, if institutionalised, will facilitate development of national price and trading monitoring and information system. Additionally, as development of storage facilities, storage of produce based on grading and assaying, and financing against stocks becomes easily connected with the e-trading system, such a system will provide enormous choices to the farmers of selling their produce at their will, availing credit if required and making trade based on a complete national information system. This reform should be pushed by the states very aggressively.
95. Automation of operations in agriculture markets is very essential in view of the fact that agriculture commodities are bulk commodities, requiring primary processing for assaying and grading and need to be handled efficiently for movement, storage and transport. It is therefore necessary that a system of automated mandis is institutionalised in the country, connected with major consumption markets and also with ports in case of exportable commodities. This is best done by inviting massive investments in marketing infrastructure from private companies. Concessions have been offered for import of modern bulk handling machinery on project basis for encouraging private companies to enter this business. States need to consider modernising the marketing infrastructure by automating operations in the mandis and with connected markets.
96. In order to promote marketing of perishable fruits and vegetables, a reform linked scheme for providing assistance for setting up state of the art modern Terminal Market Complex (TMC) by Private Entrepreneurs (P.E.) in hub and spoke format has been provided under

the National Horticulture Mission. The market will have all required infrastructure facilities such as storage, cold storage, electronic auction etc. The floor subsidy is 25% of project cost with a ceiling of subsidy of 40% up to Rs 50 crore per TMC. There is a provision of equity participation by producers association in the TMC upto 26%. Bidding is going on for TMC project at Babangaon in Thane District of Maharashtra, Perundurai in Erode District of Tamil Nadu and Patna in Bihar. States should take up necessary action to promote establishment of Terminal Market Complex Projects in PPP mode.

97. Due to record levels of procurement in the last three years, several States have been facing a problem of storage capacity. It is observed that procurement has gone up from 423.07 lakh tons in 2004-05 to 576.61 lakh tons in 2008-09. Due to shortage of storage capacity, substantial quantity of wheat had to be stored in covered and plinth storage (CAP storage). Automating mandis and establishment of concomitant storage will facilitate in creating capacity for storing.
98. In order to provide scientific storage facilities in rural areas, a capital investment back ended subsidy scheme titled Gramin Bhandaran Yojana is under implementation. The main objective of the scheme includes creation of scientific storage capacity with allied facilities in rural areas to meet various requirements of farmers for storing farm produce, agricultural inputs, etc. and prevention of distress sales through the facilities of pledge loans and marketing credit. Under the scheme, subsidy @ 25% (33.33% for NE and Hilly areas) is provided for construction of godowns. Funds available under the Scheme should be fully utilised to create a network of rural godowns in the country. In addition, storage facilities and other market infrastructure can be created under Rashtriya Krishi Vikas Yojana (RKVY).
99. India is the second largest producer of fruits and vegetables in the world. A large proportion of the produce gets wasted due to improper post harvest handling and fragmented cold chain. Action needs to be taken for creation /upgradation of 3.38 million MT of cold storage capacity during XI Plan, as recommended by the Task Force. Technical standards for cold storages and CA storages have been finalized and notified w.e.f. 1st April 2010 linking assistance under NHM, TMNE and NHB. The cost and subsidy norms for cold chain components such as cold storages have been revised upwards under NHM. Cold storages have to be upgraded to meet these technical standards.

## **VI. Addressing land and labour related issues**

100. Considerable attention has been paid for taking up programmes for raising production and productivity, but several institutional reforms are still to be taken up. Mid Term Review of

Eleventh Plan highlights the need for reforming three “I”s: Investments, Incentives and Institutions. Institutional issues of land and labour need to be addressed to ensure the sustainable growth of the agriculture sector and to incentivise investments in the sector.

101. Agriculture lands of absentee landowners generally remain underutilized. These landowners do not find land prices attractive enough for selling, even as small farmers genuinely interested in cultivation do not have resources to purchase land. Such land could be cultivated through lease arrangements, but land owners avoid such leases for fear of losing ownership of the land due to tenancy laws. Leases take place on the basis of oral agreements for short periods, which discourages productive investments on the land. This leads to inefficiency in resource-use. Similarly, large number of rural families own very small holdings which are not viable. Liberal land lease laws would permit many such families to lease out their land which would improve productivity and scale of operations.
102. Studies in West Bengal confirm that much higher productivity is achieved in small and marginal farm when irrigation facilities and other inputs are made available. Similar results have been achieved in Andhra Pradesh and Bihar. Some states have taken up programme to purchase lands from willing farmers to redistribute the same to small and marginal farmers. Such programme can be taken up by States.
103. There is also need to reform land administration. Planning Commission, in the Mid- term Appraisal of the Eleventh Plan, has observed the need to ensure registration of land lease deeds for protecting the interests of retailers/processors and to computerize land records for bringing about greater transparency and reliability.
104. Appropriate enabling policy instruments need to be evolved to take into account emerging land markets for promoting investments and achieving higher level of farm productivity. At the same time, the interests of the small farmers should be protected and promoted by suitable institutional mechanisms that give them better access to the market.
105. Land ceiling laws in India do not permit corporatisation and industrialisation of agriculture. It is necessary to initiate this process. To begin with, agriculture land ceiling for corporates could be increased to 25 times the ceiling for individual farmers.
106. Agriculture in India is highly labour intensive. Therefore, availability of labour is crucial for agricultural production. It is generally believed that due to high level of underemployment and unemployment in rural areas, there is no shortage of labour in agriculture. However, the reality in a large part of the countryside is different. Evidence from field observations in various parts of the country reveals that at peak times either adequate labour is not available or it is available at very high wage rate. Thus, despite huge rural population, at times farmers face difficulties in getting hired labour. There are many reasons for this. One, rapid growth of construction sector, public works and non-farm

activities are providing alternative employment avenues for rural labour. Two, sizeable part of rural labour migrates to urban areas or commutes from rural areas to work in small towns and urban areas. Three, labour preference to work outside agriculture is increasing. Four, National Rural Employment Guarantee Scheme has reduced supply of labour for agriculture work. As MGNREGS offers much less strenuous work, labour prefers to work in MGNREGS projects rather than in agriculture. Availability of labour for agriculture has also been severally affected by lack of willingness of members of farm families to undertake manual work in agriculture. Policy review is needed to ensure that schemes like MGNREGS do not restrict labour availability during agriculture operations.

107. Appropriate farm machinery needs to be developed for taking up traditional labour based work like transplanting, inter cultural operations, harvesting of sugarcane etc.