

12th June, 2014

Monsoon 2014 - Agro Advisory

IMD forecasts on 9th June, 2014 indicate below normal rainfall i.e. 93% over the long period average for the country as a whole. The region-wise forecast reveals deficient i.e. 85% of the long period average over North-West India, normal over North East and below normal rainfall in remaining parts of India. Rainfall deficiency in North-West India may not affect productivity and production because of assured irrigation. If we go into past history, productivity may even increase due to non-prevalence of pests and diseases and better sunshine in drought year. Of course higher consumption of electricity and diesel may raise the cost of cultivation. There will also be permanent extra loss of ground water resources. More rainfall deficit in the main month of July as compared to August will push towards late sowing of the crops. Keeping in view the forecast, the following contingency measures may be considered:-

- i) Food, feed, fodder and drinking water stocks may be updated and plan of their quick deployment prepared. Market sentiments should behave normal because of more than sufficient buffer stocks of food grains.
- ii) PDS system may also be updated keeping in view the latest experience of its operation.
- iii) Projects for creating productive and durable assets under MGNREGA may be prepared to provide jobs in rural areas for better management of droughts in future.

A. AGRICULTURE

North West India

1. North-west part of India, going to receive deficient rainfall, is irrigated mostly by the ground water along with canal irrigation. This region should be provided assured supply of electricity and diesel. All precautions should be taken to enhance energy efficiency of the power utilities by way of proper maintenance of motors, engines, pumps, etc. and even replacement of the defective utilities. Frictional losses should also be minimised to get highest output and delivery of water.
2. Canal irrigation roster may be revised to take care of rainfall deficit during critical stages of crop growth in the region. Canal distribution system should be cleaned, de-silted, repaired and renovated to minimise distribution losses of precious canal water.
3. Alternative more efficient methods of sowing and irrigation like ridges and furrows, small sized basins along with mulching of the crops other than paddy are recommended to save water.
4. Repair of the field bunds, trenches, gully plugs, earthen check dams and other structures especially in the forest, waste lands, common lands and private farm lands should be taken up immediately preferably utilising MGNREGA funds wherever possible.
5. Weeding, hoeing, inter-culturing and thinning of the plant population would be able to minimise competition of water for the main crop.

6. There is likelihood of extra exploitation of ground water over the normal decline of water table in this already over-exploited region. This net loss should be minimised by re-charging of runoff, roof top rainwater etc.
7. Alternative methods of seeding and irrigation of water guzzling paddy may be considered as per local recommendations. Superfine short duration and late planted varieties of Basmati consume less water.
8. Irrigation one or two days after the disappearance of water in the paddy fields can also economise water consumption.

North East India

1. This region is going to experience normal rainfall and can be looked upon for realising better productivity to compensate production losses elsewhere in Central India and Southern peninsula. Rice and maize are the major crops during the monsoon season. All kinds of good quality inputs, extension services and other needs should be arranged to enhance productivity of the normal rainfall.
2. Soils of NEH region are acidic in nature and liming of maize, rainfed rice and other crops is important for raising efficiency of other inputs, productivity and production and its stocks may be arranged.
3. North East India is also known for *boro* cultivation having highest potential of productivity. However the *boro* season would be requiring irrigation both with ground water as well as seasonal flows. All measures to realise efficient use of water and higher productivity mentioned above for the North West region may be looked into for the North East region also.

4. About 10-12 hectare of land remains fallow after rice harvesting and there are vast potentials of raising second crop by rainwater harvesting and limited irrigation.

Central and South peninsular India

1. This region is pre-dominantly rainfed with limited irrigation potentials of ground as well as surface water here and there and rainfall is predicted below normal.

2. All field bunds, contour bunds, gully plugs, check dams and other water harvesting structures should be repaired, renovated and de-silted for *in situ* conservation and storing whatsoever rain falls.

3. More area should be covered under integrated watershed development activities with IWMP, MGNREGA, National Horticulture Mission, RKVY, BRGF and other resources. Convergence would be required to overcome guideline limitations of these schemes.

4. All irrigation utilities including piped conveyance system required for giving life saving irrigation with the limited water stored in farm ponds, check dams, lifting from the water streams etc. should be serviced and required additionalities may be arranged.

5. Land titles have been given to a large number of families of tribals and other forest dwellers under FRA 2006 and are highly vulnerable small land holders. This group of farmers may be covered with very special intensive and extensive extension services, inputs, land shaping and watershed development activities. Special interventions may be taken up in the adjoining fringe forest area for ground water re-charging, harvesting of surface water and re-cycling into the fields of tribals and other dwellers downstream.

6. Watershed development interventions in the forest area, waste/common land will also be required otherwise for *in situ* water conservation, re-charging of aquifers, preventing soil erosion and its down-stream externalities. This will also provide fodder, forages, feed for livestock and non-timber forest products for the local communities. The idea is to involve all kinds of stakeholders.
7. All inputs especially seeds of alternative short duration and drought tolerant crops and varieties may be assured.
8. Climate smart or robust farming systems with proper mix of deep rooted hardy trees and livestock components of safety nets may be promoted.
9. Protected cultivation under the cover of nets, polythene sheets and other local materials is most efficient user of water, fertilizers and other inputs. It is quite risk free and may be promoted.

Overall, for the long range strategy, the time has come to promote most efficient micro-irrigation system with the help of renewable solar energy for sustainable management of limited water resources and droughts. At the current prices, an investment of Rs.3-4 lakhs per ha in the medium and major irrigation projects with a gestation period of 8-10 years and ultimate efficiency of 37% is being made in the public sector. Micro-irrigation system, energized with renewable solar energy, especially for lifting ground water or from the perennial or seasonal flows, costs much less (about Rs.2.2 lakhs per ha) with a gestation period of a few months and efficiency in the range of 70-90%. In the canal system, the farmer gets turn of the water after 8-15 days interval which is not very congenial for staggering of his field operation uniformly over the weeks, months or season.

The use of solar energy does not entail any investment into transmission and distribution works. The farmer is not to pay any electricity bill and assured water supply of 6-7 hrs. per day is very convenient for efficient deployment of his labour, animal/other power and many agricultural operations. This system can be introduced in already existing canal command and water saved can be deployed in arid and semi-arid region as a durable safety net in drought frequented regions. Feasible and affordable inter-basin transfer of water on the regional scale can also be considered to mitigate droughts.

B. HORTICULTURE

About 80% of horticulture especially in hills and mountains is rainfed. Most of the temperate and sub-tropical fruits have been harvested before the rainy season and mangoes are being harvested. Current rainfall deficit may affect vegetative growth and will reflect in the next year's productivity/production. In case of coconut the current year productivity will be affected if drought comes before flowering. The contingency measures are expected to be taken up keeping in view the perenniality and growth phase of the orchards as described below:-

1. Most of the new orchards are generally transplanted during spring and in the monsoon season. *In-situ* budding of plants is relatively more drought tolerant because of extensive and deep roots of rootstock as compared to grafts.
2. Survival of the *in-situ* budded or grafts can be further ensured by *in-situ* rain water conservation, harvesting and recycling. Micro catchments can be reshaped to direct run-off towards the tree trunk. Field bunding, trench ring, gully plugging, mulching with crop residue, litter or plastic sheets is recommended.

3. Rainwater harvesting into tanks and its application with drips will be the most efficient system of water management.
4. Solar energy system for lifting ground water from low water yielding aquifers, canals and water stored in diggies is now feasible. A three HP photovoltaic solar energy system costs about Rs.4.5 lakh and can serve 2-3 hectares of land. Investment @ about Rs.2.5 lakh per ha into the solar energy, with a gestation period of few months, is more competitive than the current investment rate of Rs.3-4 lakhs per hectare into canal irrigation system with a gestation period of 8-10 years. Moreover the farmers do not have to pay any electricity bills and there is assured water supply of 6-7 hrs. per day. There is no need for any investment into transmission and local electrification. Unlike canal delivery, daily availability of water is very useful for domestic and livestock purpose.
5. Rainy season fruiting of guava can be discouraged by spraying 4% urea to have a bumper crop in winter season having better quality, better prices and returns.
6. Plantations and spices in tropical region also respond favourably to the sunken basins, trench ring around tree, other measures of *in-situ* conservation, mulching with the organic or plastic materials, weeding, water harvesting, drip irrigation and fertigation.
7. Coconut response is different if the drought occurs at flowering or post fruit setting stages. Nevertheless *in-situ* conservation, water harvesting into farm ponds, recycling through efficient methods, weeding and mulching is always useful.
8. In many districts of Maharashtra, the villagers or micro-shed farmers prepare annual water budget depending upon rainfall forecast and decide planting and cropping pattern in a participatory manner.

9. *In-situ* rainwater conservation, ground water recharging and even water harvesting in upstream fringe forest area helps in many ways. Livelihood based on non-timber forest products, tribals and other forest dwellers will gain. Drought tolerance of crops, vegetables and fruits in downstream area will be improved.
10. NHM funds can be used for making a farm pond and providing micro-irrigation sets.
11. Thinning of vegetable populations, application of organic manures, re-sowing if mortality is more than 50%, gap filling, re-sowing of drought tolerant vegetables and varieties will be required.
12. Cultivation of vegetables under formal or informal expensive shade nets, poly houses can provide much needed security.

C. FORESTRY

Following collateral interventions/activities are suggested to be taken in forestry sector:-

1. The local participatory institutions such as Joint Forest Management Committees (JFMC), Eco-Development Committees (EDC), Van Panchayats etc. should be encouraged to deal with droughts to supplement contingency plans. These institutions should be strengthened through capacity building, infrastructure, equipments and resources to effectively intervene during floods and droughts.
2. Around 1.74 million ha forest land has been allotted to 4.66 million highly vulnerable tribals and other forest dwellers under the Forest Rights Act (FRA) 2006. Soil and moisture conservation practices, rainwater harvesting and availability of seeds of drought resistant varieties of crops may be ensured. Additionally, farmers may be encouraged to plant non-timber forest products (NTFP) in order to ensure regular income.

3. In drought prone areas plantation of tolerant deep rooted fodder trees, shrubs and seeding of grasses in degraded forest lands should be invested as a long term strategy. Re-seeding of indigenous grasses and inclusion of leguminous components such as *Stylosanthes sp*, *Sirato sp*, etc. and plantation of top fodder drought tolerant trees and shrubs (e.g. *Prosopis cineraria*, *Hardwickia excels*, *Acacia nilotica*, *Acacia auriculiformis*, *Acacia catechu*, *Colospermum mopane* etc.) can improve availability of fodder, feed and forages. The less productive grasses may be replaced with recently developed more productive and drought tolerant varieties of *Cenchrus ciliaris*, *C. setigerus*, *Lasirius indicus*, etc.

4. In drought prone areas, the farmers may be encouraged to plant fast growing light canopy drought tolerant fodder trees and shrubs (e.g. *spineless Opunita sp*, *Acacia sp*) and perennial napier grass along agriculture bunds in an agro-forestry system. This form of agro-forestry will not only yield surplus fodder during prolonged dry spell but will also protect crop from wild animal predation. The States forest departments may assume the role of supplying quality of planting material via a network of high tech fodder species nurseries and seed centres.

5. Livelihood options based on Non-timber Forest Products (NTFP) may be encouraged in the fringe forest drought prone areas as safety net against crop failure. The states may establish NTFP storage facilities and develop processing and value addition centres linked with domestic and commercial markets in these areas.

6. In drought prone areas, in situ conservation of rainfall through soil and moisture conservation (SMC) works in fringe forests may be undertaken to improve the productivity of forests. Drought tolerant species of perennial grasses and bushes having ability to revive quickly and yield reasonable fodder biomass may be encouraged to regenerate and/or plant

along contour trenches/bunds/blanks to act as vegetative barrier to conserve soil and moisture.

7. Chances of fires in forests and elsewhere increase with rainfall deficit. It destroys biodiversity and burns, seeds, protective cover of litter on the ground leading to high run-off and soil erosion during subsequent rainfall events. Fires may also engulf matured or harvested and staked crops, farm sheds etc. Fire lines should be maintained or created wherever lacking.

D: LIVESTOCK

In the event of below normal and deficit monsoon as indicated by IMD coming true, the livestock sector is also likely to be adversely affected along with the crop sector in such of those regions where drought like situation may occur. As per predictions of IMD the Central India and Southern Plateau States are likely to receive below normal rainfall whereas, a normal rainfall is predicted in the Eastern and North Eastern states. North West region is likely to have deficit rainfall. The States which are likely to be affected have to draw up appropriate contingent plans in advance to effectively tackle the issue from the Livestock sector perspective. For managing the shortage of feed and fodder and maintain the production levels of animals in the coming months and to tackle drought like situation effectively, the following advisory is being recommended

North West Region (States of Rajasthan, Punjab, Gujarat, Haryana)

- From livestock perspective, farmers of arid regions of Rajasthan and Gujarat are generally well versed with the coping mechanism for sustaining their livestock wealth and maintaining production levels during drought situations.

- In case of prolonged drought like situation, necessary steps have to be initiated for ensuring adequate fodder supply for livestock. Some of the general strategies which can be adopted are
 - i. Establishment of Fodder Banks for storing and distribution of dry fodder need to be strategized.
 - ii. A large number of *Gaushalas* exist in the State. The list of *Gaushalas* and their capacities could be updated, their managers informed and financial assistance assured for setting up fodder/feed banks and livestock camps at short notice.
 - iii. Sheep herders migrate with their flock for long distances in search of fodder. Provision for supply of mineral mixture and for de-worming of the animals during migration would ensure maintaining body weight and lower mortality.
 - iv. Along the traditional migratory routes, water feeding troughs may be erected and supply of drinking water ensured.
 - v. Urea Mineral Molasses Block (UMMB) can be effectively utilized as a combined source of protein, energy and minerals during drought situations. They also help in preventing loss of fertility in case of prolonged drought. These blocks can be easily transported over long distances.
 - vi. Fodder Bajra varieties of *RBC-2*, *Giant Bajra*, *Raj-171*, *JBV-2* may be promoted.
 - vii. Buffel grass (*Cenchrus ciliaris*); Guinea Grass (*Panicum maximum* var. *Macuni*) may be propagated in *gochar* lands and other common grazing areas
- Both Punjab and Haryana are traditionally considered as surplus states for livestock fodder. However, continued drought like situation may alter this situation in the current year.

- If the rainfall deficit persists, the state has to initiate advance action to ensure that livestock production is maintained. The following recommendations are being made
- i. Traditionally paddy straw is not fed to cattle and buffaloes. In case of feed shortage in the coming months, paddy straw may have to be utilized for feeding. With the technology of feeding Total Mixed Ration, paddy straw could be incorporated up to 25-30% and utilized effectively.
 - ii. Progressive dairy farmers in both the states have adopted in a big way the practice of conserving green maize crop as silage for feeding animals during lean months when green fodder is not available. The farmers adopting this technology need to be suitably incentivised. Further, an efficient network for veterinary services and input supply exist.
 - iii. Many of the operations in hi-tech dairy farms are power dependent. Adequate power supply to these farms needs to be ensured.
 - iv. Feed Block making machines may be provided for densifying wheat bhusa and other bulky dry fodders and storing the feed blocks at strategic locations.
 - v. Growing of fodder maize and *Pearl millet* varieties of green fodder may be encouraged and incentivised.

Southern Plateau Region (States of Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra)

The States of Southern Plateau are likely to have below normal rainfall during the ensuing monsoon. The rainfall pattern in the coming few weeks would indicate the severity

of the likely rainfall deficit. The following advisory are being recommended to plan the contingent measures in advance.

- i. In drought like situations the state governments normally adopt the practice of procuring dry fodder from Punjab to tide over the shortage. Considering the time frame required for actual arrival of the dry fodder in deficit districts, it is advisable that a short term contingency plan be formulated on priority. Surplus dry fodder available in other districts within the state or from neighbouring states may be procured on priority.
- ii. Fodder Banks may be established in all the affected districts for storage and distribution of dry fodder. Establishing a **Hub and Spokes** arrangement would facilitate efficient and timely transport of fodder at all levels.
- iii. The initiative taken in Maharashtra during the drought of 2012 of procurement of sugarcane crops from sugarcane growers, transporting of the same and distribution to livestock owners in deficit areas at subsidised rates may be replicated by other states as well wherever feasible. It is a **win-win situation** for all stakeholders.
- iv. List of *Gaushalas* and their capacities could be updated, their managers informed and financial assistance assured for setting up fodder/feed banks and livestock camps at short notice.
- v. Simple storage facilities with raised platform and covering dry fodder/ fodder blocks with polythene sheets at Tehsil level may be created.
- vi. Fodder Block making machines be installed at the fodder banks for densifying the dry fodder in form of Fodder Blocks. This would facilitate storage and transport of large quantities of material at cheaper cost.

- vii. Some of the non-conventional feed materials like Maize cobs after removal of grains, deseeded sunflower heads etc. can be effectively utilized by incorporating them (up to 40%) in the Total Mixed Ration (TMR). The milch animals could be given TMR for sustaining the production.
- viii. Distribution of Urea Molasses Mineral Blocks (UMMB) in the affected districts for feeding to all animals would help in overcoming mineral deficiency and maintain fertility even if the drought like situation prolongs.
- ix. Short duration *Pearl millet* (AVKB-19, Giant Bajra, CO 8 varieties) crop which is hardy and requires less moisture may be cultivated if there are small rains. Cowpea (Bundel Lobia -2, KBC 2, COFC 8) as fodder crop may also be cultivated and fed to cattle and buffaloes as protein source. If adequate moisture level is available, farmers may be advised for cultivating maize crop (*African Tall & Pratap Makka* varieties).
- x. Perennial sorghum cultivation may be taken in canal command areas. Farmers growing this crop may be adequately compensated and green fodder after harvest may be transported to areas of deficit.
- xi. Wherever feasible, cultivation of fodder grasses like *Bothriochloa intermedia*, *Cenchrus setigerus*, *Dichanthium annulatum*, *Pennisetum pedicellatum*, *Panicum maximum* and fodder legumes like *Arachis hagenbackii*, *Stylosanthes hamata*, *S. Scabra* may be promoted.
- xii. Cattle camps may be set up at strategic places with adequate provisioning of dry fodder, water and veterinary care. Cattle owners may prefer to send only the dry and scrub animals to these camps and retain the milking animals in their houses. As such, a mechanism for ensuring supply of feed and fodder at their door steps

may be put in place. “**Cattle cards**” similar to ‘Kisan cards’ may be distributed to such farmers so that they can draw their quota of feed and fodder from the nearby fodder depots established by the State government.

General Recommendations

- a) A loss of body weight up to 20% in Cattle / Buffalo, 30 to 40% in Sheep / goat /Camel could be sustained during drought situation. Body weight loss beyond this becomes critical
- b) Even though migration of livestock from drought affected districts is an accepted safety net, large scale migration may be checked due to interstate concerns and quarantine issues.
- c) Restrictions on interstate fodder transportation, if any, may be rescinded.
- d) Fodder depots to be established for supply of fodder to milch animals to ensure that there is no loss of milk production.
- e) Non producing and scrub animals could be maintained at cattle camps / goshalas
- f) In sugarcane growing areas, sugarcane tops and dry sugarcane leaves may be transported to deficit areas and effectively utilized for feeding livestock.
- g) If deficit is very serious, sugarcane baggase and press mud may be treated and transported to deficit areas for survival feeding.

- h) For utilizing residues of crops which are normally not fed to livestock, the practice of Total Mixed Ration (TMR) should be propagated. Such non-conventional feed material can be incorporated in TMR at 10-15% level.
- i) Early mornings and late evenings feeding to be followed
- j) Availability of drinking water for animals to be ensured. In places of acute water scarcity, providing drinking water on alternate days could also be followed.
- k) As the sowing of main rabi fodder crops will start in October-November, catch crop of maize, *bajra*, sorghum, cowpea, *bajra* + cowpea, maize + cowpea and *toria* may be taken up after light showers during August-September.
- l) Rapeseed and mustard, Chinese cabbage, *gobhi sarson* and maize may be sown in September for fodder purpose wherever feasible. These crops will be harvested by November to facilitate the sowing of *rabi* cereals
- m) The canal command areas could be utilized for growing fodder crops like oats, barley, *kasni* and *lucern* etc.
- n) For moderating the fodder scarcity, grazing of grasses in fringe forest area, feeding of tree leaves after lopping may be explored in consultation with Forest Department.
- o) Dual purpose crops like barley (varieties RD 2715, RD 2035, RD 2522 and BH 75) may be sown in October. One cutting may be taken for fodder at 50-60 days after sowing and subsequent regenerated crop left for grain production.
- p) Partially damaged wheat grain may be diverted for feeding to save the productive animals. However, substandard wheat having very high aflatoxin

content should be avoided as the same may result in abortion in pregnant animals.

- q) Where ever possible, vegetable/ fruit wastes could be utilized for feeding livestock. Since they have high moisture content, it may be sun dried and transported to deficit areas.

E: CONCLUDING REMARKS

Drought Contingency plans drawn at the National level are largely contextual and provide broad advisory guidelines for policy formulation at the State level. Indian Council of Agriculture Research (ICAR) and Department of Agriculture and Cooperation (DAC) provide crop contingency plan strategies up to the district level. However, the effective implementation at the ground level depends upon effective coordination between district administration, line departments and other agencies like Krishi Vigyan Kendras, VOs/ NGOs etc.