

Crop cafeteria – An effective tool

to showcase diversity and choice of cultivars to farmers

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Crop yield in given agro-climatic conditions are determined by interactive effects of many factors. Amongst these, choice of suitable variety and appropriate agro-techniques are major determinants of crop yields. Majority of farmers, particularly in hot arid regions have been using old/traditional varieties and hardly following recommended seed rate and spacing due to lack of knowledge. Popularization of improved crop varieties along with better agro-techniques among the farming community through different extension and training programme has been advocated but it takes lot of time for adoption on large scale. Therefore, for disseminating the significance of improved varieties and crop management practices among the farming community a concept of Crop Cafeteria was executed where diverse improved varieties along with suitable crop management practices for pearl millet, moth bean, mung bean and cluster bean were demonstrated at Research Farm of ICAR- CAZRI. Thousands of farmers visited the Crop Cafeteria and witnessed that yield can be increased 2-3 times by adopting improved crop varieties and crop management practices compared to their conventional management with traditional varieties.

Key words: Crops, Crop cafeteria, Improved varieties, Production technology

CROP PRODUCTION in north-western hot arid regions of Rajasthan is predominantly rainfed. Pearl millet, cluster bean, mung bean and moth bean are major crops being grown over 12 million ha and accounts for about 80% of the total *kharif* cropped area under rainfed conditions of arid western Rajasthan (Table 1). These crops possess peculiar morpho-physiological adaptation to survive and producing reasonably stable yields under extremes of temperature and moisture stresses. Besides providing

economic yields, these crops provide quality fodder for the livestock and hence have an immense significance to the existing farming systems of the arid regions because livestock is an integral component of agrarian economy of the region. Furthermore, the legume crops (cluster bean, moth bean and mung bean) play an important role in restoration of soil through fixing the atmospheric nitrogen, litter fall and arresting soil erosion. But the crop yields are low due to low and erratic rainfall, recurring drought and poor soils

which make the crop production very risky in the region. The average productivity of pearl millet, cluster bean and mothbean in north western hot arid region are <0.5 t/ha. The lack of use of improved varieties and crop management practices (improper seed rate and method of sowing, use of untreated seed, imbalanced use of fertilizers, plant protection measures and weed management practices) are major reasons for low yields of crops in the region.

Table 1. Status of major arid zone crops in India and Rajasthan.

Crop	India			Rajasthan			% of India	
	Area (Lakh tonnes)	Production (Lakh tonnes)	Productivity (Lakh ha)	Area (Lakh ha)	Production (Lakh tonnes)	Productivity (kg/ha)	Area	Production
Pearl millet	74.7	98.0	1312	41.5	41.6	1001	55.5	42.4
Clusterbean	56.0	28.2	504	47.9	22.2	465	85.4	78.7
Mungbean	43.2	21.7	502	21.2	10.5	495	49.1	48.3
Mothbean	14.2	4.5	317	13.9	4.4	313	97.7	96.7

Crop cafeteria

Role of improved crop varieties in ushering productivity is very well recognized since the green revolution era. The results of frontline demonstrations over the years have proved that 30–40% increase in yield can be attained with suitable crop variety recommended for specific region along with integrated nutrient management. But these efforts are on selected crops/varieties in isolated places with limited impacts due to many factors. Various extension methods, i.e. front line demonstrations, training (on-farm and on-station), crop cafeteria, *kisan mela* & *kisan gosthi*, radio and TV talk, use of print and electronic media have been used for transfer of technology. Among them, the crop cafeteria plays an important role of facilitator in the process of technology transfer among farming communities. Crop cafeteria provides an opportunity to witness relative performances of different crops, their diverse varieties having different maturity period, stature and purpose (grain or dual) along with suitable agro-production technologies. Thus, in contrast to FLD which involve single crop along with a few (two or three) varieties, the crop cafeteria gives broader choices and a visitors have opportunity to evaluate relative performances of different crops and their multiple varieties as per his/her priority. It provides practical experiences based on the principle of 'seeing is believing' and face to face views for disseminating technical knowhow to the farmers, rural



Crop Cafeteria showing different varieties of major *kharif* crops.

youths and extension functionaries. The crop cafeteria proves as an *Evidence Hub* to exhibit multiple crops/varieties as well as to analyse their performance under different management conditions.

In arid regions, use of improved crop varieties/hybrids is limited and seed replacement rate is also low due to lack of awareness. Therefore, to demonstrate the visible impact of improved crop varieties along with optimal crop management practices, a concept of "Crop Cafeteria" has been implemented where diverse cultivars of pearl millet, cluster bean, moth bean and mung bean were demonstrated under suitable production techniques during *kharif* seasons (2016, 2017 and 2018) at Central Research Farm of ICAR – Central Arid Zone Research Institute, Jodhpur.

Field visits of farmers and other stakeholders were facilitated to

sensitize them about relative performance of different cultivars of crops with suitable crop management practices. More than 12,000 farmers and other stakeholders of the region visited the "Crop Cafeteria" and live on-spot discussions with technocrats/extension personals educated the farmers pertaining to choice of varieties and management practices suitable for different moisture availability period, soil types etc. Farmers greatly appreciated the distinction among the varieties of same crop particularly for maturity, pod bearing and plant type in legumes. This provided opportunity to farmers for their own judgment in selecting the variety after making fair comparison. Furthermore, the farmers get handy technical know-how to maintain proper plant stand, weed management, moisture conservation during stress and plant protection measures for realizing full



Stakeholders discussing the relative performance of different varieties in Crop Cafeteria



Women farmers closely comparing varieties of mung bean grown in Crop Cafeteria at CAZRI, Jodhpur

yield potential of varieties. The response of farmers and officers of line departments was overwhelming and some of the varieties like IPM-2-3 and IPM-205-7 (mung bean) and MPMH-17 (pearl millet) become popular within two seasons and their seeds are in great demand. The personal discussion with the visiting farmers revealed that crop-cafeteria is an excellent option to evaluate performances of diverse varieties of crops in terms of duration, stature, yield, abiotic and biotic stress tolerance etc. Furthermore, in addition to significance of choice of varieties, the farmers realized the importance of suitable agro-techniques and plant protection measures to achieve better crop yields.

Performance of crops in crop cafeteria

Mothbean: There are considerable variations in economic yields among different cultivars for all the crops. The grain yields of 15 varieties of mothbean varied from 607 to 1557 kg/ha with an average yield of 1278 kg/ha. The duration of varieties of mothbean varied from 63 to 94 days. Averaged across two years, amongst the varieties of mothbean, the RMO-423, CZM-2 and RMO-225 had higher grain yields (>1500 kg/ha). It is worth-mentioning that varieties having duration >80 days gave low yield compared to that of short duration (<70 days) varieties presumable due to their ability to escape the terminal drought which is of common occurrence in arid regions.

Pearl millet: The yield of different cultivars of pearl millet varied from 2663 to 3395 kg/ha with an average yield of 2998 kg/ha. The MPMH-17, GHB-905 and GHB-732 were high yielding (> 3300 kg/ha) cultivars and GHB-538, GHB-558 and HHB-67(I) were low yielding (<3000 kg/ha) cultivars, and rest of cultivars were intermediate in grain production (3000-3300 kg/ha). The duration of different cultivars varied from 69 to 79 days. Relative performance of cultivars of pearl millet demonstrates that 25% higher yields are possible with using suitable cultivars.



Yield and duration of different cultivars of (A) mothbean, and (B) pearl millet in crop cafeteria at Jodhpur, Rajasthan

Clusterbean: The seed yield of clusterbean varied from 1113 to 2310 kg/ha with an average seed yield of 1940 kg/ha. Averaged across the years, the RGC-1033, RGC-1038, CAZG-16-12, CAZG-15-5-8 had higher seed yield (>2200 kg/ha) and GG-1 had lowest yield (<1150 kg/ha). The RGC-986, HG-2-20 and Maru guar had 1600 to 1700 kg/ha seed yield. The duration of cultivars varied from 85 to 118 days.

Mungbean: The grain yields among 20 varieties for mung bean had range: 1114–1721 kg/ha, with average of 1536 kg/ha. Averaged across years, the IPM-2-3 and GM-4 had higher grain yield (>1700 kg/ha) and Pusa Ratna, ML-2056 had the lowest yield (<1300 kg/ha). The duration of varieties varied from 62 to 85 days. The results demonstrate that a 50% higher yield can be achieved by using improved varieties.

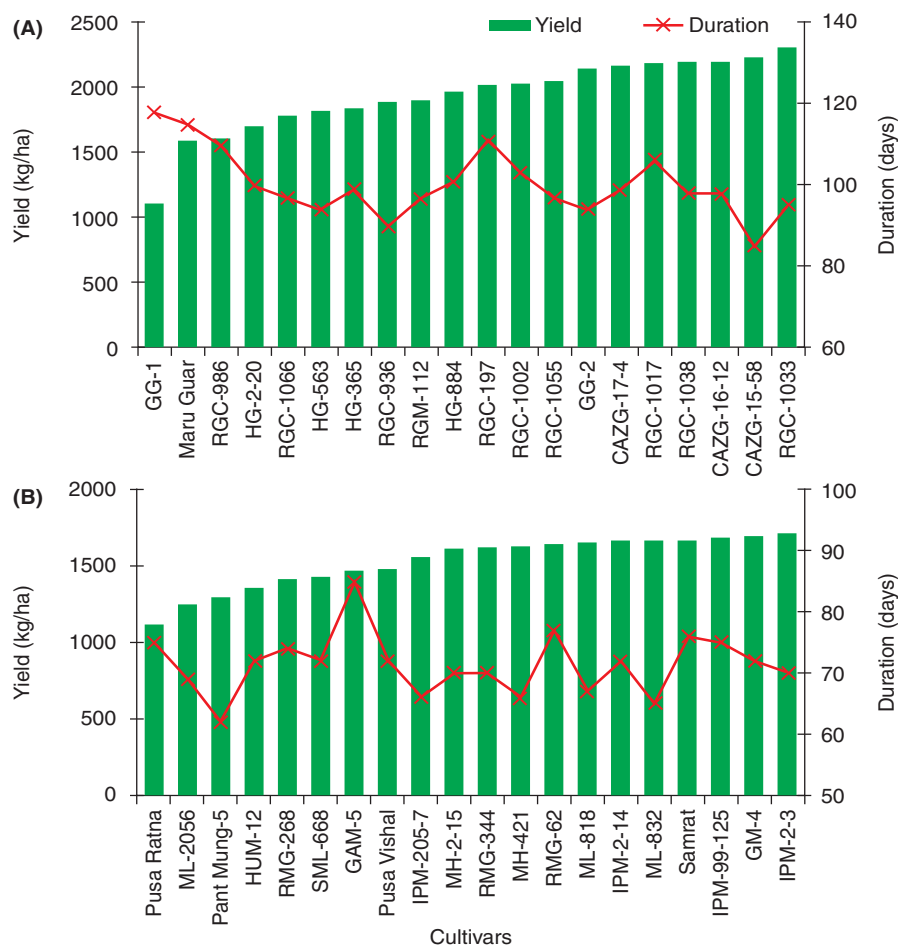
Experimental yield compared to farmers field yield

The comparative analysis of yield

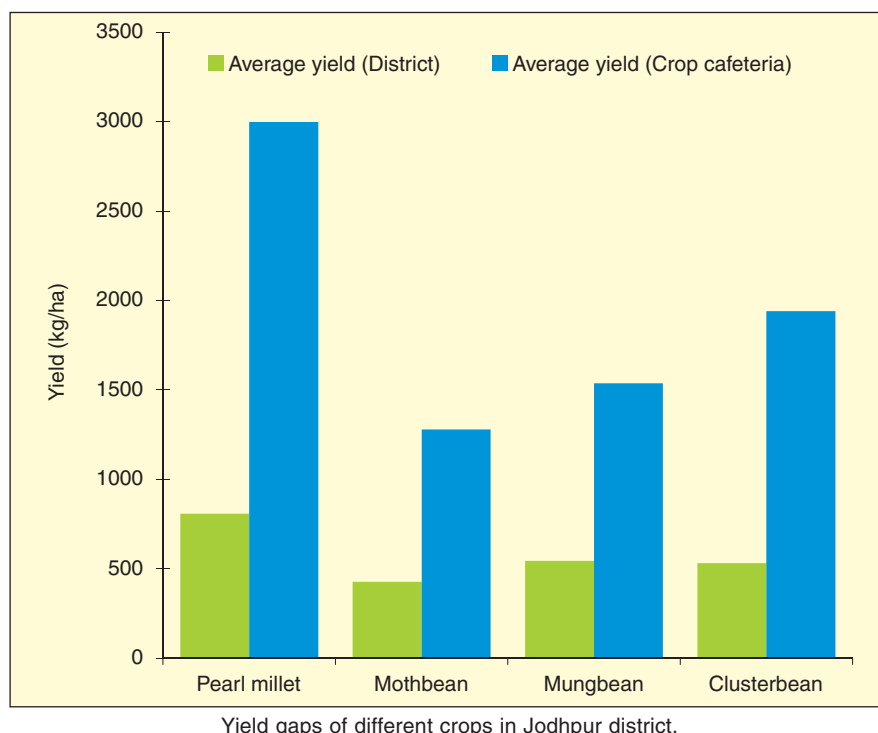
performances of different cultivars under suitable crop management practices with the five year average yields of selected crops (five year ending 2015-16) in Jodhpur district indicates huge yield gaps. The yield gap is highest for pearl millet (2190 kg/ha), followed by clusterbean (1409 kg/ha), mung bean (992 kg/ha) and mothbean (851 kg/ha). Furthermore, results suggest that by using improved cultivars and suitable crop management practices the yields of these crops can be enhanced by 2.8 to 3.7 times than traditional varieties and crop management practices.

Our experiences showed that recommended varieties and improved practices should be adopted

- For better rainwater utilization and timely sowing of the crops, field should be properly leveled and deep ploughing is recommended to reduce run off and conserving water in the field itself.
- Use of improved and recommended crop varieties of the agro-climatic



Yield and duration of different cultivars of (A) clusterbean, and (B) mungbean in crop cafeteria at Jodhpur, Rajasthan.



Yield gaps of different crops in Jodhpur district.

zone makes a vast difference.

- Depending on the onset of monsoon, sowing of pearl millet and mung bean should be done before 15th July. In case of delayed sowing, early maturing varieties of pearl millet (HHB-67 improved) or mung bean (IPM-205-7, IPM-2-3 and MH-421) may be used. Sowing of the moth bean and cluster bean can be done in second fortnight of July. Mung bean prefers comparatively heavy soils while moth bean performs better on light soils.
- Seeds of hybrids should be purchased every year in case of pearl millet from reliable sources while harvested seeds can be used for 2-3 seasons in case of improved varieties of cluster bean, mung bean and moth bean provided mechanical mixture of seeds of individual varieties avoided during harvesting and handling.
- In good rainfall zone (> 350 mm), pearl millet and mung bean should be sown while in zone with less than 350 mm rainfall, cluster bean and moth bean may be cultivated.
- Seed should be treated with fungicide/insecticide before sowing.
- Row to row (45-50 cm) and plant to plant (10-15 cm) spacing should be maintained properly as per the growth habit of crop/variety.
- Crop should be weed free particularly at initial growth stages (30-40 days) in order to avoid competition for nutrients and soil moisture. Further a good hoeing is advisable after 25-30 days of sowing for proper aeration and moisture conservation.
- Wherever irrigation facilities are available during the prolonged dry spell, a life saving irrigation at reproductive stage is very useful for getting good yield.

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