

PROJECT SUNSHINE & HYBRID MAIZE PROMOTION IN GUJARAT

Report of a Rapid Appraisal

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Background on Project Sunshine in Gujarat

Project Sunshine, piloted in 2007 as Project Rainbow in 300 villages of 13 talukas by Monsanto, an American seed company which is the world's largest seed company today, was started in 7 talukas of Dahod and Panchmahal districts of Gujarat in 2008 (as per a Monsanto proposal document available online on the Vanbandhu Kalyan Yojana website, in addition to a GO and Circular dated 14th May, 2008). In that year, the Project which focused on promotion of hybrid maize seed amongst tribal cultivators, was implemented with 30000 beneficiaries. The objective for the project was set as doubling of incomes in five years' time. In 2011, it got implemented in 20 talukas of five districts (Banaskantha, Dahod, Panchmahal, Sabarkantha and Vadodara), covering nearly 2.25 lakh cultivators.

Project Sunshine is an integral part of "Integrated Wadi and Agriculture Diversification Programme (IWADP)" of the Tribal Development Department (TDD) of Government of Gujarat. Project Sunshine has been created for rainfed areas of North and Central Gujarat, while "Jeevika" is meant for South Gujarat, promoting vegetables and fruits for irrigated land. These two projects form two main components of "Integrated Wadi and Agriculture Diversification Programme (IWADP)" being implemented by the TDD, assisted by Development Support Agency of Gujarat (D-SAG), an autonomous society created for the purpose. Within Project Sunshine, Sunshine I promotes hybrid maize while Sunshine II promotes cotton, pigeonpea, mustard and potato.

D-SAG is supposed 'to conceptualise individual projects, tie up funding from various sources, engage implementing agencies through open advertisements and monitor the processes'. The overall size of the IWADP was Rs. 656 crores with a target to cover 3.3 lakh farmers (EOI No. VKY/2011/1290/D-SAG, accessed from the Van Bandhu Kalyan Jojana website on February 7th 2012) as on March 2011. The objective of IWADP is stated to be the doubling of income of tribal farmers through productivity enhancement. It is worth noting that this project talks about "involvement of local people in planning and monitoring of various interventions launched for the benefit of ST families" right at the outset.

It is important and interesting to note that documents from the D-SAG for IWADP describe Agricultural Diversification thus:

- : *"Diversification is defined as diverting of sizeable acreage from the existing cropping system to some other alternate crops/cropping systems/farm enterprises, while maintaining a general equilibrium in meeting the need for food, fiber, fodder and fuel of the country.*
- : *Diversification simultaneously also takes care of the basic soil health, productivity and agro-ecosystem of the area at large.*
- : *Crop diversification has been recognized as an effective strategy for achieving the objectives of food and nutrition security, income growth, poverty alleviation, employment generation, judicious use of land & water resources, sustainable agricultural development and eco-system improvement.*
- : *Integration of different agriculturally related enterprises with crops provides ways to recycle the products and byproducts of one component as inputs to another and reduce the cost of production and increase the total income of the farm".*

(From the Revised IWADP-RKVY proposal document, page 31, accessible on the VKY website, with our emphasis).

Project Sunshine's interventions are meant to cover seed distribution, chemical fertilisers' distribution, soil testing, micro-credit and banking services, rainfall insurance, farm mechanization, extension and marketing support¹.

¹ ('Ekikrut vaadi evam krushi vaividhikaran project', D-SAG, 2011)

Expansion of Project Sunshine over the years

	Districts	Talukas	Villages	No. of Farmers	Project Outlay
2008	2	7	535	30000	19.12 crores
2009	5	16	1707	141031	35.30 crores
2010	5	19	?	132951	44.04 crores
2011	5	20	?	223819*	54.94 crores

* is for Kharif 2011.

The coverage of the project under Stream I (of hybrid maize) specifically for 2010-11 (last year for which such data is available):

District	Taluka	No. of Farmers/Acres
Dahod	Dahod	17086
	Limkheda	11994
	Jhalod	5231
	Fatehpura	9200
	Devgarhbaria	1140
	Garbada	14962
	Dhanpur	1563
Panchmahal	Santrampur	12862
	Kadana	5768
	Goghambha	2582
Sabarkantha	Bhiloda	6400
	Vijaynagar	3500
	Meghraj	2200
	Khedbrahma	13000
Banaskantha	Danta	2513
	Amirgadh	2400
Vadodara	Chotaudepur	8550
	Pavijetpur	8000
	Nasvadi	4000
TOTAL	19 talukas of 5 districts	132951

Source: EOI-3 document, on Van Bandhu Kalyan Yojana website

As mentioned earlier, 2011 Kharif saw 2.24 lakh farmers/acres being covered in the project.

Cost Breakup for 2009

Chemical Fertilisers	14.440 crores
Proprietary Hybrid maize seed	14.080 crores
Rainfall Insurance	04.380 crores
Vermi-compost	00.096 crores
NGOs' cost	02.110 crores
SAU monitoring costs	00.171 crores
IEC materials	00.027 crores

Source: 'Ekikrut vaadi evam krushi vaividhikaran project', D-SAG, 2011

The target set for 2011 was 272500 beneficiaries and these beneficiaries were divided up amongst different seed companies (the basis is unclear): Monsanto: 200,000; UPL: 24,500; Pioneer: 24,000 and Shriram Bioseeds: 24,000. Each beneficiary is supposed to get 8 kilos of hybrid maize seed from these companies, in addition to 50 kilos each of Urea, DAP and MoP.

The breakup of expenditure, for 2011 is given as under:

Program (Amount in Crores)		Administrative (Amount in Crores)	
Fertiliser	24.350	Project Coordinator	0.13
Seeds	17.330	Supervisor	2.42
Insurance	06.780	Depot staff	0.11
Transport	00.140	Other expense	0.09
Unloading fertiliser	00.007	Vehicles	0.03
Unloading Seeds	00.001	Total administrative	2.78
Training	01.360	Contingency	2.10
Godown expenses	00.120	TOTAL PROJECT	54.94 CRORES

It is interesting to note that as the project expands the difference in outlays between seed and chemical fertilizers, both supplied on subsidy in this project expands with fertilizers taking up larger and larger share.

KHARIF MAIZE SITUATION IN GUJARAT

Data on area and yield of Kharif maize in the project districts from 2004-05:
(Area in hundreds of hectares and Yield in Kilograms/Hectare)

	Banaskantha		Dahod		Panchmahal		Sabarkantha		Vadodara		Gujarat	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
2004-05	85	2003	1240	636	1148	669	1273	1128	520	1119	4595	989
2005-06	104	2365	1088	1430	1172	1310	1254	1960	527	1438	4569	1581
2006-07	107	1548	991	137	1157	178	1157	589	531	952	4477	451
2007-08*	116	2703	1021	1080	1172	1303	1011	1448	518	1765	4240	1375
2008-09*	107	1773	1146	1378	1139	1175	903	1450	486	2086	4189	1439
2009-10	94	1585	1181	869	1121	756	883	1028	475	1466	4117	963
2010-11	98	2193	1200	1700	1151	1396	869	1612	433	1975	4225	1638

Source: Directorate of Agriculture, Govt of Gujarat's data

* Project Rainbow taken up in this year; ** Project Sunshine initiated.

As per GoI data, only 9.2% of Gujarat's maize cultivation was under irrigated conditions in 2007-08. It is clear that yields have been fluctuating widely across years within a district and are also vastly different across districts (Banaskantha having higher yields than other districts on an average – Banaskantha: 2024 kg/Ha; Dahod: 1033 kg/Ha; Panchmahal: 970 kg/Ha; Sabarkantha: 1316 kg/Ha; Vadodara: 1543 kg/Ha and state average at 1205 kg/Ha as average yield over the past 7 years. No data analysis has been done to see if the inter-district variation is because of greater irrigation coverage, while general information suggests that this could indeed be the case with Banaskantha and Sabarkantha).

While it is too early to make any inference based on state level data, given that the project covers only around 35-37% of maize area in the five project districts, it is apparent that there have been no appreciable yield increases at the state level or at the district level that are significantly higher than good yields in the recent past, before the project intervention.

Percentage proprietary hybrid maize coverage through the project from 2008:

	Maize cultivation area in hectares	Project coverage area	Percentage coverage
2008	228500 (Dahod & Panchmahal)	30000 Ha (Dahod & Panchmahal)	13.12%
2009	375400 (5 districts)	141031 (5 districts)	37.57%
2010	375100 (5 districts)	132951 (5 districts)	35.44%

Source: Compiled from data available from project documents on VKY website

As mentioned earlier, despite such coverage (the actual hybrid maize adoption must be higher, with farmers buying private sector hybrid maize seed from the market too), there are no significant yield

increases apparent from year to year. In fact, the district level data of the past 7 years shows that there have been three bad seasons with yields dipping dramatically, pointing to weather vagaries playing a key role in influencing maize yields with or without the project and hybrid maize seed, in a predominantly rainfed growing region.

We also present here extracts from an earlier note that covered Project Sunshine, drawing from the findings of two commissioned research projects of the project (Extracted from "Monsanto-ising Indian Agriculture": Paper on Public Private Partnerships between state governments and Monsanto in India, November 2010).

The commissioned Impact Assessment Report of the Anand Agriculture University on this project has the following to say:

(1) The Dekalb hybrid corn being used in the project matured 23 days later than the local cultivars (85 days);

(2) The hybrid yielded grain 81.17% higher than local cultivars on an average. (However,) the hybrid was cultivated under protected soil moisture, recommended high chemical fertilizer dose and plant protection measures. It is also important to note that the reported percentage increase in per day, per acre productivity with hybrid, as per this study is 44.97%. (Per day, per acre grain productivity was 8.01 kilos for hybrid and 5.52 kilos for local);

(3) Farmers benefited 46.71% in net income from Prabal hybrid cultivation – however, land (being) engaged for 23 days more than local cultivation (would mean) it may be difficult for rainfed farmers to adopt cropping sequence and intercropping;

(4) The University report also points out that looking to socio-economic conditions and ethnic preference, the tribal farmers may not prefer Prabal hybrid because of late maturity, high input requirement, purchase of costly hybrid seed every season, high cost of seed, rainfed and marginal cultivation practices and their food preference in the tribal belt of Gujarat. The farmers of Panchmahal, Dahod and Vadodara like white flint and early to medium maturing hybrid/varieties whereas, Sabarkantha and Banaskantha maize growers prefer early to medium maturing, yellow flint hybrids/varieties suitable to intercrop, cropping sequence under rainfed and marginal farming. Some them used F2 seed to cultivated from previous produce;

(5) The University also recommended that Prabal hybrid should be compared with recommended hybrids / varieties of AAU as well as AICRP (All India Coordinated Research Project) on maize (ICAR) for the state.

The official Concurrent Monitoring & Evaluation Report of Project Sunshine (Phase II) brings out a trend that might be worth focusing on, though the magnitude is negligible at this point of time: the study found that borrowing has increased amongst the farmers compared to before the project intervention (GIDR report). When farmers borrowed from moneylenders, some had to pay 3-5% interest rates a month, on top of the higher price of required inputs that they bought through credit.

This report also points out that the agriculture university recommends less utilisation of fertilisers compared to Monsanto Company. "Overuse of fertilisers to the otherwise degraded soil in rainfed areas questions claim by the Monsanto Company of sustainable agriculture" says the report.

It is also important to note that the increase in seed price of hybrid maize has been increasing at a phenomenal rate and this data is presented in the evaluation report. Where the value of seed was reported to be Rs. 156/- on an average per acre over five districts studied in 2007, it was Rs. 1194/- in 2008 and Rs. 1145/- in 2009.

This study also points to shortage of water for one watering. It was observed that over the years,

the study area has been facing the shortage of one watering (maize crop grown in kharif requires at least two waterings). On an average, farmers incur the cost of Rs. 698 per acre in watering. The irrigation is from wells where the water is drawn using diesel or electric motor, which further adds to the cost of watering.

Yield in 2009 was 700 kilos per acre, which was lower than the previous year (743 kgs per acre). Further, the yield of 743 kgs in 2008 is very close to the state average yield, it is reported. The evaluation report mentions that even though the researchers asked the farmers about the difference in yield between what was claimed by the company and what was actually harvested, farmers considered the yield good, compared to traditional variety of maize.

This evaluation report also found out farmers' perceptions on quality. Nearly half of the farmers reported that quality of the produce had positive implication in raising price of the produce. Further discussions revealed that the general price rise in price of the crop led them to believe that this change was a result of better quality of the produce of maize crop.

At this juncture, we flag off the following as the main issues from secondary data:

- * The project looks at income improvement objective almost in exclusion to other parameters that should guide such large interventions including sustainability, food and nutrition security, seed sovereignty, bottom up planning and implementation frameworks and self governance etc.
- * There is no evidence yet on any maize yield improvements in Kharif season in the project districts
- * An overwhelming majority of Kharif maize area is rainfed and subject to weather vagaries as reflected in vastly fluctuating year-on-year yield figures; this situation obviously points to a need for assessment of riskiness of any new technology/project.

THIS RAPID APPRAISAL OF PROJECT SUNSHINE

Given the project's rapid expansion, given the specific vulnerabilities of the tribal farmers in the region, given that a controversial seed company is a key player in the project and given that such Public Private Partnerships pose newer questions and challenges related to governance, that too when it comes to poverty reduction and livelihood improvement, a Rapid Appraisal visit was undertaken on January 30th, January 31st and February 1st 2012, by a team constituted by Alliance for Sustainable & Holistic Agriculture (ASHA). The team consisted of Kavitha Kuruganti of ASHA, Kapil Shah of Jatan Trust, Atul Pandya of CEE (for one day) and Purvi Vyas, an environmental management professional. The team met with some senior officials directly or indirectly connected with Project Sunshine, civil society groups in the project districts (ones who work in the project areas but not acting as PIAs as well as a former PIA), maize scientists, farmers' unions representatives, well-known tribal leaders etc. The team mainly interacted with farmers from several villages of Sabarkantha, Banaskantha and Dahod districts.

MAIN FINDINGS FROM INTERACTIONS WITH FARMERS

The team interacted with around 20 farmers in Khedbrahma of Sabarkantha district (list of farmers annexed), with a couple of farmers in Kheroj village of Sabarkantha district, with 40 farmers in Virampur village, from around 10 villages of Amirgadh and Danta blocks of Banaskantha and with about 14 farmers in Agaasvani village in Dhanpur block of Dahod district (list of farmers annexed).

While in Sabarkantha district, farmers were already drawn into market-oriented agriculture, with hybrid maize adoption rates reported to be as high as 90% for many years now, in Banaskantha, the project is introducing hybrid maize into farms for the very first time (in a group of 40 farmers, only 5 farmers reported buying hybrid maize seed from the market in any case and these were farmers with irrigation). This was the case in Agaasvani village too. Sabarkantha farmers were also more aware of the details of the project, prices of various products in the market, were confident of their seed-producing skills even when it comes to hybrid technology given their exposure to hybrid

cotton production etc. There was a certain 'majority view' that emerged in Khedbrahma discussions and Agaasvani discussions with farmers, whereas the discussion in Virampur threw up mixed findings on almost everything that the team was delving into.

There are mixed responses that we got from farmers during this rapid appraisal when it came to Yields of hybrid maize. While a majority held the view that hybrids yield higher, there was a great deal of variation in observations about how much higher. More importantly, even though the view prevails, many farmers actually reported no or low yields across different years, citing bad weather.

In Khedbrahma, in a meeting organized with around 20 farmers from several closeby villages by an Adivasi Mahasabha member, it was reported that one acre of desi seed yields around 10-15 mann of 20 kilos each (2-3 quintals), while hybrid seed yields around 30 mann (6 quintals), which is double the yield than desi. In this area, adoption of hybrid maize is already quite high (nearly 90% as per the farmers' estimate) and farmers buy different hybrid maize seeds from the market of their preference ("we were not consulted on which seed we would prefer within private hybrids; there are several others which are suitable for us, based on the color and duration of the crop", they said). These yields are in the case of mixed cropping of half of the land devoted to maize and half to pigeonpea (it was reported that those with irrigation go in for monocropping of maize, since they do not want to wait for pigeonpea before going in for another crop, whereas for the rainfed farmers, such mixed cropping ensures risk minimization). Farmers also reported that without chemical fertilizers, hybrids will not yield whereas desi maize can be expected to yield something. In Kheroj village, we were told that while desi/composite yields around 14 quintals in a good year, hybrid goes up to 16-20 quintals per acre. In Virampur, where around 40 farmers from about 10 villages of Amirgadh and Danta blocks assembled to interact with us, farmers reported that in 2009, there was a crop failure and the same phenomenon got repeated in 2011 too. Here too, farmers reported that hybrids won't grow or yield without adequate chemical fertilizers or water. Many farmers reported yields ranging between 20-25 mann with desi and 30 mann with hybrids, per acre. Some farmers reported that in 2010, hybrids yielded nothing.

In Agaasvani village, the reported range of yield with desi was 7-13 mann, with GM6 composite seed 20-35 mann and with hybrid, 20-25 mann.

In all the interactions, there was a unanimous view that they prefer desi for their food consumption, since it is softer and tastes better. In Virampur, the consumption is of grains that are mixed (desi and hybrid, of different colored grains). In Agaasvani village, farmers reported that livestock eat any fodder/stalk fed to them without showing any preference while in Virampur, majority of the farmers reported that livestock do not prefer consuming hybrid maize since it is harder/thicker.

When it comes to grain storage, while the general view is that special care is required for all grain, farmers in Agaasvani reported that hybrid grain can be stored only for 2 months or so while desi can be stored for upto 10 months, there was a mixed view in Virampur (this could also be because farmers here tend to keep the grain mixed).

Cost of cultivation with hybrid is reported to be higher in all locations – seed cost in addition to higher fertilizer use and pesticides like phorate are the reason for this. Consequent borrowings for investment on the crop are also more in the case of hybrids, according to farmers in Virampur whereas desi does not require any external borrowings at all, they said.

There was a unanimous view that hybrid maize crop extracts more nutrients from the soil (one view was that it was because of its longer duration), and a view that without chemical fertilizers, hybrid will not grow or yield. On pest incidence, in Khedbrahma and Virampur interaction, farmers reported that pest incidence is higher in hybrid maize, while in Agaasvani village, farmers said it was similar in both desi and hybrid maize. Market price is the same for hybrid and desi grain according to Khedbrahma farmers, while in the other two locations, farmers reported a marginally higher price for desi maize (Rs. 20/ more per mann).

Farmers reported continuing with their mixed cropping practices especially in rainfed conditions whereas hybrid maize cultivators (ones who wanted to maximize yields for selling the market, or ones who found inter-cultivation difficult otherwise or ones with irrigation who wanted to go in for a second crop without waiting for the maturing of pigeonpea crop) went in for monocropping of hybrid maize. We did not come across any desi maize farmer who is not into mixed cropping.

Enormous increases in seed prices were reported by farmers in Khedbrahma. Five years ago, branded hybrid maize seed would be available for five hundred rupees a packet (of 5 kgs), whereas seed is now available at Rs. 1500/packet also, they said.

All farmers reported that the hybrid maize seed being distributed in the project matures at least 15-25 days later than desi crop which poses a great additional risk in rainfed conditions. They also pointed out in Khedbrahma that there are some hybrid maize brands which do mature in around 80 days. Farmers questioned the rationale of the same brand of seed being distributed everywhere across districts.

Farmers in Agaasvani reported contamination of their white maize with the hybrid seed.

There was also an unanimous view that hybrid maize is more stress-intolerant, especially in low-rainfall years – farmers reported that the situation that they face is that of low rainfall, in most years, rather than high rainfall.

When asked about farmers buying hybrid maize seed from the market after the project ends, in Agaasvani there was a unanimous view by all farmers that they would not opt for hybrid seed in future; an overwhelming majority in the Virampur meeting also said the same (only a few of us who can afford the seed price will opt for it, they said; when asked how many will come forward if there was no free fertilizer distribution thrown in even now, no farmer raised his/her hand!). The Khedbrahma farmers, who have been purchasing hybrid maize from the market prior to the project intervention also said that they would continue to cultivate hybrid maize and if the prices become exorbitantly high, they would attempt to make their own hybrid maize seed!

Importantly, there was a recurring view shared in all interactions that we had over three days – that farmers are getting into the project because of free chemical fertilizers and not because they are attracted to hybrid maize seed *per se*. There were reports that some farmers did not even plant the hybrid seed but utilized the chemical fertilizers that they obtained over their various crops. In Agaasvani it was reported that a subtle threat was issued to farmers who did not want the hybrid maize seed that their name will not appear in the scheme in future if they did not accept the seed. This is reiterated by the GIDR study also, which shows that nearly 10% of the sample farmers did not plant the seed distributed in the project while another 11% used lesser seed than was distributed.

It was also apparent that farmers were not (being) consulted about the project intervention, its design and details, its implementation etc.

RAPID APPRAISAL TEAM'S MAJOR OBSERVATIONS

1. **LACK OF TRANSPARENT AND ACCOUNTABLE GOVERNANCE:** For at least two years (2008 and 2009), due scientific and administrative processes were set aside in the name of Public Private Partnership (PPP) in this project. This meant that Monsanto's Dekalb Prabal, which is a Double Cross Hybrid, was distributed free of cost to farmers, at a cost to the exchequer of Rs. 99.375/- per kilo of seed² without any ostensible scientific reason - this raises questions of transparent and accountable governance. Why Monsanto, when it is a company

² As per a legal document/MoU obtained under RTI from the Directorate of Agriculture in Rajasthan, wherein the Gujarat seed price is cited and obtained by Monsanto from the Rajasthan government too!

known for anti-farmer behaviour and other controversies? Why Dekalb Prabal, when it is known that it is a maize bred for industrial uses more than as a food crop where the locals don't prefer eating it or its color, when it is a longer-duration variety which increases risks for cultivators in a rainfed situation, when it is a double cross hybrid which is considered inferior to single cross hybrids? Why at around Rs. 100/kilo, when double cross hybrids in the market are cheaper (in fact, in Rajasthan, Dekalb brand hybrid maize was supplied at Rs. 72/kilo by the same company; public sector hybrid was available at 47.50 rupees per kilo!)? This means that **just in 2009, the company got nearly 2 crore rupees more in Gujarat (which is equal to the additional net returns supposed to have been accrued at an average of Rs. 1866/acre as per AAU's evaluation report of 2009, by 10,700 beneficiaries of the project!),** because of the price it quoted and obtained in the PPP rather than in a competitive setting.

While this team did not get to see the MoU for this PPP, going by the PPPs obtained under RTI Act from Odisha and Rajasthan for similar PPPs between state government and Monsanto, it is clear that these PPPs are tilted against farmers and in favour of the company, especially when it comes to liability issues. Liability is kept limited to replacing seed with seed for germination failures. This is then weaker than the already-weak seed regulation in place in India!

Even in the past two years, how did Monsanto end up getting the largest seed supply orders with other players like UPL, Pioneer and Shriram BioSeed getting to supply a substantially smaller portion of the seed requirement in the project?

We were also told by a D-SAG consultant that the one-time bidding that took place was meant for five years of seed supply on certain terms and conditions! What is the scientific or administrative/fiscal rationale for this arrangement? What is the point in commissioning concurrent monitoring and evaluation if deals are sealed in this manner?

2. WHY HYBRID MAIZE? WHY PROPRIETARY HYBRID MAIZE? WHY FAVOUR AN ANTI-FARMER MNC AND FLOUT SET NORMS?:

As mentioned above, hybrid maize, which might produce higher yields *in the optimal growing conditions*, is being promoted in this project, irrespective of other issues that arise concomitantly. These include questions on affordability and availability of those optimal conditions, sustainability implications, community preferences for their food etc. It is interesting to note that in the shortcuts chosen by the project, in the name of doubling incomes of poor tribal households, other productivity-enhancing options like public-sector-bred maize composite lines have been forgotten. While hybrid maize itself raises some questions (in the case of the brands in the project – duration of crop, storage/shelf life period, palatability and cooking quality, stress intolerance etc.), the promotion of proprietary hybrid maize raises other questions, which have already been raised in the first paragraph above.

3. ARE THE YIELD-INCREASE CLAIMS MATERIALISING ON THE GROUND? MORE IMPORTANTLY, SHOULD NOT NET RETURNS BE COUNTED?:

As reported in the findings section, many farmers reported that they really got nothing from the hybrid maize, citing adverse weather, even though a general perception of higher yields with hybrid maize exists everywhere. It is also important to note that yield comparisons between desi and hybrid seem to be happening in unequal conditions (including in the AAU study) – farmers themselves reported “step treatment” to desi maize plots, compared to the hybrid maize plot. The AAU's study also, with its limited sample size of desi maize growers shows that fertilizer use in all these cases was far lower than with the hybrid seed. The moot question then, is, would the existing cultivars or public sector composites have produced better yields with similar kinds of investments (financial and extension support-related) were made on them? The range reported within yield increases is also quite high. In some places, it is reported to be one quintal higher per acre, in some other places, it is supposed to yield doubly higher than desi. Some questions around yield measurements also arose given that several farmers in Dahod were not able to give any clear measure of their produce, desi or hybrid. This is because they bring back cobs bundled up and after separating grain, just store them in the traditional granaries, which are of different sizes in different houses. Their impression of yield is mostly from the standing crop.

Usual yield differences cited by experts and literature is about 20% more in hybrids than composite lines and about 15% more with composite lines over local cultivars of farmers. The GIDR report talks about a 47.6% higher yield of hybrid over traditional maize seed in their study sample (237 kilos on an average per acre higher in hybrid seed plots). The AAU study of Project Sunshine, based on data obtained from 1109 farmers who had sown Prabal seed in the project, compared to 126 OPV farmers in 2009 Kharif shows that while OPV yielded 11.69 quintals per hectare on an average, hybrid yielded 21.58 quintals per hectare. This is a difference of 3.9 quintals per acre, which is quite substantial as far as farmers are concerned. However, it has to be remembered that the growing conditions in which the comparison happened are very different – one field (hybrid) with various inputs provided and another without any.

Apart from Yields, **Net Returns** is an important measure to be used for assessment. It has been found in the GIDR study, that the net return is Rs. 1222/acre on an average. This is close enough to an additional Rs. 1866/acre reported by the AAU study in 2009 (Rs. 4666/- per hectare as the additional benefit in hybrid cultivation in the project, reported as a 46.71% increase). Is Rs. 1866/- more, with all inputs supplied with 3-sigma-tolerance, extension and training support ostensibly put in place etc., not possible by other options? Let us say, by improved market interventions; by collective marketing efforts? By better agronomic practices? By adopting composite lines? How is this not-so-significant improvement in net returns supposed to be sustained when seed prices go up, as they would inevitably, when farmers do not always get to provide inputs (on a timely basis)? It is also important to assess this picture at the project level: as per GIDR's data (*presented in a "State Level Dialogue on Emerging Concerns in Gujarat's Agriculture", organized in Vadodara on July 21-22, 2011 by Bhumiputra, Jatan and Indian Environmental Association*), the cost per beneficiary in the project was Rs. 7354/-³, whereas net returns per acre earned by farmers supported by Project Sunshine is Rs. 2311/-. Net returns when not supported by Project Sunshine amounts to only Rs. 1222/- as per the data presented.

Further, the GIDR report also presented the following picture of maize yields in the state, with or without Project Sunshine: average yield of 1128 kgs/Ha of maize in tribal region and a compound annual growth rate of 2.33% (with a 47.1% increase in yield by 2005-06, from 1990-95 indicated in brackets below) which is not very different from the average yield of maize in non-tribal region, at 1457 kgs/Ha, and a compound annual growth rate of 2.57% and a 43.3% increase over yield levels in 1990-95.

Fluctuation in Yield by Tribal & Non-Tribal Regions (1990-91 – 2005-06)

Crop	Tribal Region			Non Tribal Region		
	Avg Yield	Growth Rate	CV	Avg Yield	Growth Rate	CV
Maize	1128 (47.1)	2.33	21.5	1457 (43.3)	2.57	24.8

4. **HAVE OTHER PERTINENT DIFFERENCES BETWEEN HYBRID AND DESI MAIZE CULTIVATION BEEN TAKEN INTO CONSIDERATION? WHAT ABOUT ISSUES BEYOND INCOME IMPROVEMENTS?:** Farmers reported in Khedbrahma that hybrid maize cultivation requires three times more chemical fertilizers than desi seed! They also mentioned that pest incidence is found to be higher in hybrid maize, compelling them to use pesticides like Phorate. An incidence of cattle dying due to acute poisoning was also reported. Further, a majority of the farmers assembled there were also clear that the current yields of hybrid cannot be sustained for long and that unless they take up organic farming practices, their productive resources will be degraded.

³ A D-SAG consultant cited Rs. 2350/- as the support per beneficiary – this could be the value of the free inputs supplied from the project whereas the GIDR figure is the total project cost divided by number of beneficiaries

Issues of food preferences have not been kept in mind while designing the project, nor have issues related to increased riskiness in livelihoods due to the intervention. Increasing chemicalisation of agriculture and consequent degradation of resources and other impacts, dependence on unreliable or scarce external resources, increasing cost of cultivation and potential external borrowings, diminishing net returns etc., have not been obviously assessed in this project with its short-term pursuit of income improvements in a blinkered fashion. When it comes to food and nutrition security matters, apart from the food preferences of farmers in favour of their desi seed, the grain storage issue with hybrid seed brands like Prabal must be flagged off (a maize scientist later explained to the team members issues with dent and flint type grains).

It is unfortunate that despite the progress in development discourse all around, this project thinks that leakage-proof delivery and doubling of incomes at any cost are the most important parameters to pursue. What about building vibrant community level institutions for sustainable livelihoods' improvements, what about community participation and preference, what about sustainability on various fronts, what about food security concerns, what about risk and vulnerability assessments, what about seed sovereignty issues, what about weighing various options scientifically and with the community before finalizing the project design?

- 5. ARE THERE NO OTHER ALTERNATIVES FOR INCREASING PRODUCTIVITY AND INCOMES?:** This team had the opportunity to interact with Utthan (NGO working in Dhanpur block of Dahod district) team and find out more about the grassroots level seed multiplication and distribution programme that they have started in 2009 with GM6 (Gujarat Makai6) a composite line of the Main Maize Research Station of AAU in Godhra, as part of a CINI initiative. Here, Foundation Seed obtained from the research station is being multiplied on 30-40 acres by the women's federations created by the NGO (Vanita Sanghatan and Ekta Sanghatan). The seed thus produced, with adequate planning, training and supervision in addition to input support by the registered women's federation, has in turn been distributed to around 1400 families to be planted on 1400 acres. This is certified seed that has been treated and packed with adequate care and technical supervision. In this process, public sector research products are finding a market, so to speak, amongst farmers rather than remain as a wasted investment. Seed producing farmers as well as the women's federation are able to make this into an income-generation activity, while the end-users of the seed (members of the federations again) are reporting around 6 quintals of yield per acre on an average. This is seed that is more stress-tolerant than hybrids, requires lesser inputs for performing, is more acceptable to the communities in terms of its taste and color and can be re-used for at least three years by the farmers. This brings down costs as well as risks for the poor farm households. Where required, inputs are also being supplied by the women's federation. We were told that at least four other NGOs are taking up similar interventions with tribal communities. We later met with some farmers who have obtained GM-6 seed through this intervention and used it. We were surprised to hear two farmers report good yields of 14-16 quintals per acre (which admittedly is the rare case and the other farmers reported only around 20-25% higher than their local cultivars). We found greater acceptance amongst farmers for this seed.

In the context of this discussion on alternative ways of livelihood enhancement, it is worth noting that we did not come across a single farmer who reported that their produce has been procured through any project intervention, even though Project Sunshine boasts about it. We believe that better marketing support, including by building farmers' collectives at the village level and bringing in processing/value addition into such collectives can also increase incomes. Better prices and procurement ensured for maize farmers would also improve their livelihoods. It appears that the project did not look at various options before zeroing in on Monsanto's proprietary hybrid maize seed as its core strategy.

6. **DELIVERY ISSUES:** Farmers did point out in various interactions that no consultations are held with them about their preferences. What was shocking to find in Khedbrahma, later confirmed by D-SAG consultants is the fact that public taxpayers' funds have been used in this project to help Bt cotton seed companies' seed production by subsidizing inputs. In Khedbrahma, farmers complained that the implementing NGO encouraged farmers who are into cotton seed production to use the chemical fertilizers meant for the maize plots in cotton seed cultivation. It was also reported that the fertilizer recommendation by the company is higher than the scientific package of practices recommended by the department. The GIDR data shows that farmers are ending up with higher fertilizer use than recommended by the department. Incidentally, none of the farmers that we interacted with obtained any training support in the project. We came across some instances of late delivery of mustard seed to farmers which jeopardized their crop cultivation season. Further, we came across reports of fudging and misappropriation in the case of potato seed distribution, even as farmers pointed out that potato cultivation is not suitable for the region. As mentioned earlier, there were cases of farmers who took the seed because of the free chemical fertilizers being distributed and not planted the seed.

7. **IS TRIBAL SELF-GOVERNANCE SPIRIT UPHELD IN PROJECTS LIKE THIS?:** We heard arguments against the creation of autonomous agencies like D-SAG, run by consultants during our interactions with tribal leaders. Further, the Constitutional spirit of self-governance is nowhere evident in large projects such as this. Top-down programme design and implementation seem to be the norm here. This project, despite having a large potential impact (positive or negative) on tribal communities in various parts of Gujarat, does not even select beneficiaries in a participatory, transparent fashion in the Gram Sabhas. Further, 3-sigma approach kind of management principles cannot ever substitute self-governance (good governance – of which there was not much evidence – cannot substitute self-governance, and this aspect probably applies to many projects being implemented while we were a witness to this particular project).

OUR CONCLUSION

1. Tribals prefer desi corn for their food consumption purposes while hybrid corn is less preferred; any government projects promoting hybrid corn should keep this in mind and ensure that food and nutrition security needs are met first and foremost.
2. Hybrid corn and the package being offered as part of Project Sunshine is indeed leading to chemicalisation of agriculture, which pose questions around environmental sustainability of this approach. Recommended dosage of fertilizers is higher than prescribed by the local agriculture university and unscientific.
3. While the project is running on subsidizing various inputs as of now, it increases dependency on market sources for inputs and thereby, riskiness in farming for vulnerable communities.
4. It is unclear why the government opted for proprietary seed primarily from one source, that too an American multinational having controversial record.
5. It is to be noted that fodder from hybrid corn crop is less preferred by animals, compared to local cultivars.
6. While there seems to be an increase initially in productivity and profitability, it is difficult to say how much and for how long. It appears that the government is trying to inflate the benefits compared to the reality, while ignoring the negative fallouts of the project. Net returns are negligible, especially when real costs are imputed/when the project closes down; comparisons are unscientific; the project investments are higher than the net returns obtained and all of these pose questions on this project's claims.
7. It is not understood why the government bypassed the scientific expertise available within the public sector and why such investments have not been made on approaches that are more sustainable and in the control of farmers.

8. Projects like this pose serious questions around seed and food sovereignty of communities as well as the nation and need to be re-looked at, especially given that alternative approaches are being adopted quite successfully within the project region.

Having raised several questions born out of genuine concern and from insights into Project Sunshine (which is being blindly emulated in other states, unfortunately), we conclude that Project Sunshine needs to be suspended immediately, to be reviewed by an independent expert committee consisting of various kinds of expertise and stakeholders (tribal development activists and experts, tribal leaders, maize scientists, other agriculture experts, sustainability advocates, farmers' leaders etc.). Meanwhile, project investments should be diverted into more sustainable, people-controlled alternatives which are quite possible, as small scale initiatives are showing on the ground.