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Abstract

Previous work has concluded that farmers (in developing countries) have limited voice in influencing agricultural research. However, in electoral democracies, farmers are not without political influence. The tension between these understandings is examined here by investigating the salience of farmers in the political economy of GM crop approvals in India. The paper assembles a unique data set that consists of media reports about GM crops in English, Gujarati and Marathi for the period 2010 to 2013. The media reports are coded for their content and opinion. The idea is that if firms locate themselves to be close to consumer preferences, then observing the product type (media reports) can be informative about consumer preferences. We find that it is urban interests that primarily shape the GM debate even though it has no interest in the pragmatic concerns of farmers. The immediate economic interest of farmers is emphasized more in the rural press which, however, carries limited debate on GM crops. The evidence is consistent with the notion that while farmers may not be important in shaping policy, they have the clout to defeat it. In particular, they are likely to oppose corporate control that affects their material interests.

Keywords: Agricultural Biotechnology, GM crops, Bt brinjal, Political Economy, Media, India

1. Introduction

That farmers are politically significant may seem obvious. The protests that followed the introduction of the so-called farm laws (EPW,2020) is a case in point. Yet scholars, for long, have been troubled by the paradox that, despite their numerical strength, farm movements are politically weak (e.g., Posani, 2009, Saha and Yadav, 2017).

It is in this context that this paper investigates the salience of farmers in the political economy of genetically modified (GM) or transgenic crop approvals in India. Could the interests of farmers be a dominant force in regulation, approvals, pricing and adoption of new technology? But another literature suggests that regulation and approvals do not necessarily depend on mass politics. In a review, Herring and Paarlberg (2016) (citing Blyth,2002 and 2003) conclude “...ideas about GMOs matter much more than is typically assumed by a standard political economy based on material interests (pp 411).” Their claim is that it is elite politics that construct the social frame within which regulation is debated. In this paper, we revisit this hypothesis in the context of transgenic crops in India.

The agency and power of farmers in shaping the possibilities of transgenic crops, in different contexts, have often been commented (Herring, 2015; Richards et.al, 2010). Previous work has concluded that farmers (in developing countries) have limited voice in influencing agricultural research and pondered designs that explicitly invite participation by farmers (Carro-Ripalda and Astier, 2014; Schnurr and Mujabi-Mujuzi, 2014, Stone and Flachs, 2014). In an electoral democracies such as India, however, farmers have the power of numbers. Could that result in greater voice for farmers in policy decisions?

This question is germane because the only GM crop to be commercially released, namely Bt cotton, has seen wide diffusion. Yet, there have been no approvals of any other crop subsequently. If farmers ignored the opposition to GM crops by rapidly adopting Bt cotton, why have they not been politically effective in pushing for commercialization of other crops. This paper examines a hypothesis that farmer political power is reactive rather than proactive. A status quo that is favourable to farmers is hard to change but farmers lack the influence to shape policy.

The paper uses a novel data set to examine this proposition. We assemble a data set that consists of media reports about GM crops in English, Gujarati and Marathi for the period 2010-2013. The media reports are coded for their content and slant - pro-GM, anti-GM or neither. The data set is notable for couple of reasons. First, web archives are not available for the Gujarati and Marathi newspapers and the data was collected manually. Second, the period 2010-13 was when the approval of Bt brinjal was in process and bio-tech issues were intensely debated.

The theoretical framework that justifies the use of this data set is a standard industrial organization Hotelling location model. In this model, firms locate themselves (and their products) to be as close as possible to the preferences of consumers. If all we observe are product types, then this model can be used to infer the preferences of consumers. In our context, we use this model to infer the preferences of newspaper readers from the media reports. The critical assumption is that English language newspapers reflect the preferences and interests of urban elites. Rural interests and preferences are likely to play a bigger role in Marathi and Gujarati language newspapers although there might be some differences within these categories too.

2. The Political Economy Puzzle

As is well known, the only GM crop to be commercialized in India is Bt cotton. Of the 11.6 million hectares that cultivated cotton in 2013, Bt cotton is grown on 11 million hectares (ISAAA, 2017). Within 10 years (of its approval in 2002), the diffusion levels exceeded 90%. Yet it seems that such wide diffusion has not swiftly opened the doors to other GM crops. Why not? And what does this reveal about the political economy of agricultural biotechnology?

A political economy based on material interests alone would pit farmers and biotechnology companies against the presumed losers from Bt cotton – pesticide companies, seed companies that did not have access to the Bt trait, and perhaps traders and companies that wish to deal in organic cotton.

In sheer numbers, farmers can dominate in an electoral democracy. The experience of Bt cotton ought to make them favourable to other GM crops as well. If, despite this, GM crops are not on the top of the political agenda, then it would seem that either it faces significant consumer resistance or that farmers lack the organization or the leadership to transform their numerical strength into policies. On the other hand, it is apparent that farmers do possess political power at some moments. Herring (2015) and others have argued that once illegal Bt cotton seeds were found in the fields of Gujarat, the clock could not be turned back. The approval of Bt cotton became a *fait accompli*. The anti-GM forces could not continue to persuade that Bt cotton would impoverish farmers. The arguments about food and environmental safety appealed to urban sensibilities but that could not compete against the material self-interests of the farmers.

In the case of Bt brinjal, anti-GM activists pressed the government (or the Ministry of Environment – the department of government that regulates biotechnology) and the courts for denying approval on essentially precautionary grounds – that long-term health risks were unknown. Crucially, as Bt brinjal seeds were not available to farmers, a decision to deny approval would not change the status quo and hence the visible material interests of farmers. Herring concludes that the absence of such a cost tipped the scales in favour of denying the deployment of Bt brinjal.

“First, farmers’ interests had not been made apparent through the underground diffusion of illegal ‘stealth’ seeds, in contrast to Bt cotton. Second, numbers count in political arithmetic. Though India is the second-largest aubergine producer in the world, after China, there are comparatively few farmers: only 1.4 million, farming about 550,000 hectares of land or roughly 0.36 ha per farmer. Cotton farmers number 6.3 million, on an area exceeding 12 million hectares. Third, collective action was problematic because most farmers grow other crops as well. Interests among potential beneficiaries are thus diffuse, rather than concentrated, and hence less conducive to collective action. There are no significant exports, nor forward economic linkages to engage broad developmental interests” (Herring, 2015, pp 19).

Herring's argument is essentially three-fold. First, in a democracy, urban ideologies about food and environment cannot compete with the material interests of farmers. Second, and this is an implicit assumption of his paper, the material interests of farmers are formed as a political force only after a technology is approved and they experience its costs and benefits. Prior to regulatory approvals, farmer interests are absent in the debate. Farmers lack the leadership and organization to fundamentally change a status quo. However, they are easily mobilized in a democracy to resist changes in status quo that are adverse to them. Thirdly, brinjal is an economically unimportant crop with weak linkages to the wider economy. That presumably meant there were no powerful economic interests engaged in brinjal.

These arguments seek to explain why activists lost the battle against Bt cotton but seem to be winning the war against GM crops.¹ While farmers when mobilized can easily counter the affluent urban precautionary concerns of food safety and the environment, the latter come into their own in consultations with regulators, whipping up support in the media, lobbying with ministers and in legal challenges. Their opponents – whether from the seed/biotechnology industry or public sector scientists – are also urban based.

The idea that farmers as a political force are reactive rather than pro-active has been observed in other contexts as well. Writing about agricultural policies of newly independent India (that mainly involved land reforms and cooperatives), the political scientist Myron Weiner writes “...one could write the history of the post-war agrarian policy in India, and of the political struggles which have entered into making such policy with little or no reference to farmer organizations...” (Weiner, 1962, p. 149). In his study of the power of rural interests in shaping economic policy, Varshney (1995) observes that while farmers are not organized in matter to policy formulation, they do matter to policy implementation. With reference to the land reforms policies, Varshney (p. 78) points out the position of large landlords “in the local power hierarchies enabled them to beat back the legislative pressure locally and manipulate it at the state level. Failed policy implementation was an aggregate effect of such discrete micro strategies, not of collective action or political organization”.

Another instance of how the political clout of farmers played out is the policy of price supports and government purchases of grain. Varshney argues that price supports did not come about

because of pressure from farm lobbies. Instead, “Price-based interest groups appeared on the political scene much after the policy change” (Varshney, 1995, pp 49). Because of these interest groups, it has been hard to reform price policies subsequently.

If farmers do not participate in policy formulation, then the policy debates are likely to be driven by ideologies and the material interests of affected parties (seed companies, pesticide companies, governments). The debate will then be played out in ‘elite’ politics given that there is no mass mobilization against GM crops. Varshney (1999) put forward the distinction between elite and mass politics to explain why it is easier to reform some kinds of economic policies than others. “Elite politics is typically expressed in debates and struggles within the institutionalized settings of a bureaucracy, a parliament, a cabinet. Mass politics takes place primarily on the streets” (Varshney, 1999, pp 223).

The important analytical point is that there could be economic and social policies that operate entirely within elite politics. In this paper, we consider the notion of elite politics as the struggles and debates within all institutions of governance – including commissions, regulatory agencies and courts. On the other hand, mass politics comes into play when policies are primarily decided by mobilization of electoral constituencies.

This paper examines several propositions that are at the heart of the views that sees farmers as a reactive rather than pro-active force. First, is it true that farmers play only a small role in the ideological framing of the debate around GM crops? Second, are they politically active about their economic interests when it is manifest and active? If the answers to both the above questions in the affirmative, do we also see that the policy debate about GM crops is primarily urban and also in the sphere of elite politics?

3. A Conceptual Framework

The media coverage of agricultural biotechnology may reflect, either the ideological frame of journalists, editors or owners (the supply side), or mirror the attitudes and preferences of readers (the demand side). Empirically, it has been found that demand side effects operating through the political attitudes of readers is the dominant mechanism for explaining the

ideological slant of a newspaper (Gentzkow and Shapiro, 2010). Theoretically, this can happen if media is profit-maximizing and if, as reported in many studies, consumers choose media whose bias matches their own preferences (Mullainathan and Shleifer, 2005; Gentzkow, Shapiro, and Stone, 2014).

In the context of agricultural biotechnology, Brossard and Nisbet (2007) point out the valuable role of media frames in providing information short cuts and allowing the readers to form opinions with little or almost no other information. They argue that US press coverage has generally used media frames that emphasize benefits rather than risks of the technology and that such positive framing correlates well with the reader's tendency to defer to the authority of science.

The dominance of demand side effects suggests that the ideological frames used by the media are led by the concerns and preferences of their readers. We suppose each news article or an op-ed (or opinion) piece is an exercise in policy advocacy. This is clearly the case for op-ed pieces. This is visibly less applicable to news articles. However, the necessity of selection, editing, and framing mean that news articles are choices of news reporting agents. As Page (1996, p 21) notes "Communications research has, I believe, thoroughly demolished the idea that news is or can be "value free." The canons of bland, "objective" reporting are perfectly consistent with the selection of quotes and facts, the framing of interpretations, and the attribution of importance (through repeated front page headlines, for example), all so as to support or oppose a particular policy position."²

If media framing is led by demand side effects, then one way to discover the frames relevant to different groups (e.g., consumers, farmers, policy makers) is to analyze the media frames in the media consumed by these different groups. This is the core idea explored in this paper. Empirically, we ask what is the correlation between the type of media platform (in our case, whether English, Gujarati or Marathi press) and the policy agenda. The value of this correlation stems from the supposition that a newspaper locates its agenda depending on the preferences of its readers.

The relation to the political economy propositions highlighted in the previous section comes from the following. If the debate about GM crops is primarily within elite politics, then the newspapers that respond to the preferences of elite readers will have a corresponding activist agenda aimed at informing and shaping public opinion as well as that of regulators and other decision makers. We assume that these are the English language newspapers. Secondly, if the Gujarati and Marathi press are more likely to be read by farmers and agricultural interests, and if farmers are reactive rather than pro-active, then these newspapers are (a) less likely to debate GM crops and (b) more likely to emphasize issues concerning the economics of Bt cotton (the only GM crop that farmers know about).

How plausible is the presumed dichotomy between English newspapers and the Gujarati/Marathi newspapers? English newspapers account for 12% of all newspaper circulation (RNI, 2019-20, Table 4.2, pp 54). Beyond that there is no official data on the urban-rural split of readership although it is believed that English language newspapers derive their readership from the big cities and account for more than 40% of the advertising revenue (Sarma and Kumar, 2015).

A more debatable proposition is whether the Indian language newspapers are any more rural than English newspapers. The Hindi newspapers that enjoy large circulation and readership have editions from many cities. Given the limited reach of English, the urban readership of Hindi newspapers is in many cases larger than that of English newspapers. Mudgal (2011) compared the rural coverage of 3 major English newspapers and 3 major Hindi newspapers for the year 2009. As all these newspapers have many editions from different parts of the country, Mudgal compared the flagship editions of these newspapers originating from the major metropolitan regions (Delhi, Mumbai, Chennai). Mudgal found that coverage of rural issues was low in all the newspapers. On average, English newspapers carried 2.76 stories per day. The same figure was 3.97 for the Hindi newspapers. The total number of stories per day varies between 100 and 200. So although Hindi newspapers carry more rural stories, the coverage is low in both languages. Within this coverage, farming issues receive about 10% of coverage in the English press and about 17% of coverage in the Hindi newspapers. Therefore, even though there are small differences between the national English and Hindi newspapers, these are dominated by their commonality in ignoring rural issues. If this trend

extrapolates to GM crops, then it is unlikely that newspaper coverage of GM crops would differ between English and Gujarati/Marathi newspapers.

4. Data

The data consists of newspaper coverage of GM crops in English, Gujarati and Marathi over the period 2010-2013. This period saw major developments in regulatory policy starting with moratorium on Bt brinjal in February 2010 and ending with the report of the Technical Evaluation Committee appointed by the Supreme Court to advise on the bio-safety of GM crops.

The English newspapers are Business Standard, The Hindu, Hindustan Times, Indian Express and the Mint. Of these the Business Standard and the Mint are business newspapers. All of these are leading national dailies and have editions across the country. The website search retrieves articles from all their editions and not just from the prominent metro cities. The Times of India and Economic Times, which are also prominent English dailies, are missing from this list because we could not obtain a complete coverage for them as their websites allow search for only a limited period. The Gujarati newspapers are Agro Sandesh, DivyaBhaskar, Gujarat Samachar, and Sandesh. Of these Agro Sandesh is a weekly newspaper specializing in agricultural news. The others are leading daily newspapers. The Marathi newspapers are Agrowon, Deshonnati, Divya Marathi, Lokmat, Loksatta, and Sakal. Of these Agrowon is a prominent agricultural newspaper while Divya Marathi, Lokmat, Loksatta and Sakal are leading general newspapers. Deshonnati is also a general newspaper but one that is widely read in one particular region of Maharashtra, namely, Vidharbha. This region is a traditional cotton growing area. *A priori*, Deshonnati may have greater coverage of rural affairs and of Bt cotton than the other general interest newspapers. Hence its selection.

The newspaper articles for English language newspapers were retrieved from their websites using the keywords Bt brinjal, Bt cotton and GM crops. This option was not available for most of the Marathi and Gujarati newspapers and we went through physical copies of the newspapers. Each newspaper article was read and coded for several attributes as summarized in Table 1. First, an article was coded for type: an opinion piece or a news report.

An opinion piece could be of two kinds – it could either be an op-ed article or an article that reports the view of a person or a body. The latter could take the form of an interview, extracts from a speech or from a document. Second, an article is also coded whether its position is pro or anti GM crops. If there were no consistent position discernible in the article, then it would be coded as neither. Finally, all articles were coded for their subject content. Articles were assigned to one or more of twelve categories.

The first subject category is farmer welfare. Articles that referred to impact of GM crops on farmer welfare, primarily income was assigned to this category. Note the article could assert either positive or negative impacts. The statements are most often qualitative, for example, an article could say that farmers are in distress because of Bt cotton. An article is assigned to the agronomy category if it refers to agronomic impacts such as on yields, pests, and soil health. The health category would include all articles that refer to food safety for humans and animals. The environment category refers to environmental impacts. The fifth category is about the impacts of GM crops on corporate control and market structure of the seeds market. In the health, environment and corporate control subject categories, articles critical of GM crops would assert negative impacts while pro-GM articles that contain references to these subjects would typically deny such impacts.³ The 6th category is whether the article refers to a matter concerning the regulation of GM crops. This is a heterogeneous category including articles that have fine details about the regulatory structure and policy as well as articles that simply call for regulation to be either more restrictive (such as ban GM crops) or less. The seventh category consists of articles that assert or deny links between GM crops and food security.

Category eight to twelve are factual categories relating to existing GM crops (Bt cotton in this case): price and availability of Bt cotton seeds, pest and disease issues with Bt cotton seeds, information and advice about Bt technology and growing conditions, and international news about GM crops (including research, development and regulation). A significant component of the 'others' category is reporting about area and output of GM crops in India and in countries around the world.

5. Findings

Table 2 presents the distribution of newspaper articles over time. There is a marked difference across years. Media coverage is high in 2010 and 2013. 2010 and 2013 coincide with major developments in regulatory policy. In early 2010, the government declared a moratorium on Bt brinjal. In 2013, there were significant developments in the case challenging GM crops in the Supreme Court of India. In particular, a technical expert committee appointed by the Court recommended a 10-year moratorium on all testing of GM crops. This recommendation was contentious and the response of the government occupied much of the policy arena.

Table 3 is a cross-tabulation of the Type code and the Position code. Out of the 605 observations in our data set, nearly two-thirds of them are opinion pieces. As might be expected, almost all of the opinion articles are either pro-GM or anti-GM. A very small number is neither, meaning a definite position was not discernible in the article.

The 213 news reports that do not involve an opinion are largely neither pro nor anti GM. What may be more difficult to understand is that 20 of the non-opinion pieces are pro-GM and 17 of the non-opinion pieces are anti-GM. This happens because even when the article is factual (and hence a non-opinion piece), the context either gives it a pro or anti GM meaning. For example, an article in Mint on February 24, 2010 reports that the Prime Minister asks his ministerial colleagues to specify a time frame for bio-safety testing for Bt brinjal. This intervention by the Prime Minister followed the moratorium on Bt brinjal by the environment minister where one of the cited reasons for the decision was that the bio-safety process was inadequate, incomplete and riddled with conflicts of interest. Accordingly, the moratorium was indefinite till “such time independent scientific studies establish to the satisfaction of both the public and professionals, the safety of the product from the point of view of its long term impact.”. In this context, the intervention by the Prime Minister aimed to bring a closure to the regulatory decisions and was therefore coded pro-GM. An example where a non-opinion piece was coded anti-GM is an article in Business Standard (8th March 2013), titled “Natarajan invokes conflict of interest against Pawar.” The article is about the internal conflicts within the government about policy towards GM crops. Mr. Sharad Pawar, the then

Minister for Agriculture was a prominent supporter of GM crops and Ms. Jayanthi Natarajan, the then Environment Minister did not support regulatory trials of GM crops. In the article, Ms. Natarajan objects to Mr. Pawar chairing a government committee to formulate a policy for GM crops referring to his past views. These observations aside, most opinion pieces are either for or against GM crops while non-opinion pieces do not have a consistent bias for either of these positions.

Table 4 presents the distribution of newspaper articles across languages. The Gujarati and Marathi newspapers account for only about 27% of coverage. In terms of quantum of coverage, there is a clear difference. Table 5 shows that the English newspaper coverage is dominated by opinion articles (68%) which in turn consists more of articles that report the opinions of others – ministers, other politicians, NGO activists, scientists, farmer groups, and environmental groups – rather than op-eds. The sharpest contrast to this is the Marathi coverage where 49% of coverage is not opinion. The Gujarati press is in-between with more opinion coverage than the Marathi press but less than the English Press. Table 6 reports the distribution of opinions. The Marathi coverage is biased towards pro-GM views while it is the reverse for Gujarati press. The English newspaper coverage is more balanced.

Table 7 displays the subject content of all the articles according to whether the article is pro-GM or anti-GM or neither. Each entry is the percentage of times a subject (say, food security) is discussed. For example, in the very first row, 11% of all articles that are neither pro nor anti-GM, discuss the impact on farmer welfare. For anti-GM articles, the percentage rises to 13% and for pro-GM articles, the percentage is even higher at 23%. The percentages in a column do not add up to 100 because an article may cite more than one subject. For instance, an article opposing GM crops may justify its position asserting adverse impacts on health and environment. It may also believe that GM crops strengthen corporates and multinationals in agriculture. It may conclude by calling for restrictive regulation. This article will then be coded in four subjects: environment, health, corporate control and regulation.

For all articles, whether anti or pro-GM or without a policy slant, the subject code that is most often discussed is regulation. This reflects the fact, as mentioned earlier, that the regulatory

policy and structures drew much attention from the government and the courts in the period 2010-13.

Comparing the 3 columns, it can be seen that pro-GM arguments are more likely to talk about favourable impacts on farmer welfare, agronomy impacts and food security. If anti-GM arguments refer to these subjects, they would principally deny these favourable impacts. Anti-GM arguments are more likely to talk about (negative) impacts relating to environment, health, and corporate control. Here pro-GM arguments are mostly in the nature of denying the negative impacts.⁴Articles that are neither pro nor anti-GM are more likely to talk about price and availability of GM seeds, pests and diseases of GM crops, information and advice about growing practices for Bt cotton, international news and about research developments. In table 1, these are the categories from 8 to 12. While these categories are factual, they could be combined with one of the other subject codes to arrive at an opinion. For instance, an article about the price of Bt cotton seeds might argue that it is too high and therefore conclude that GM crops are to be opposed because it aids corporations. What table 7 shows, however, is very little overlap between the information subject codes and the other subject codes.

Table 8 displays the incidence of subject codes by language. The information subject codes are more frequently cited in Marathi and Gujarati newspapers relative to English newspapers. Among these codes, the price and availability of Bt cotton seeds is the most important. Starting in 2006, price controls have been in place for Bt cotton seed. Many of the news reports are about the unavailability of some popular Bt cotton hybrids and also reports of them being illegally sold at above the regulated prices. For instance, the Divya Marathi in 2011 has the following stories: “Huge demand for Bt 2 seeds (of Kanak brand) in Bheed and seed distribution happens under police protection”;“in Deglur cotton seed is not available and farmers beat up agriculture officer”;“in Parbhani, theft in seed centre of Bt seeds worth Rs. 55,000 but thieves do not touch cash in the drawer”. Agrowon in 2011 warns that the income tax department is watching the black marketing of seeds by distributors.

Till this point, we have not considered differences within a language category. In both Marathi and Gujarati, we have one agriculture newspaper. Table 9 considers the difference

in the proportion of pro and anti-GM views between agriculture and non-agriculture newspapers. As might be expected, agriculture newspapers more often take a pro-GM stance than general newspapers. The bigger difference is, however, that agriculture newspapers have a much greater coverage of news rather than opinions. In English, there is no agriculture newspaper. The divide is between business and general interest newspapers. The difference in their coverage is also displayed in Table 9. General interest English newspapers take an anti-GM stance much more often than business newspapers. They also have a lower coverage of GM news that do not take a definite pro or anti position.

6. Are some commodity growers more powerful than other growers?

The lack of political action by farmers on Btbrinjal may also be because farmers do not have an identity as brinjal growers. Brinjal is a seasonal vegetable and possibly grown on small plots together with other crops occupying much greater area (Herring, 2015). This suggests crops that have growers that are politically organized may see more political action by farmers. Our media data set can possibly provide a criterion of a 'powerful' crop grower. We analyzed coverage in the Marathi and Gujarati agriculture newspapers for the entire calendar year 2013. All articles in a newspaper were coded for (a) the subjects to which it referred and (b) the crop to which it referred.

The frequency with which a particular subject is covered is tabulated in Table 10. Note once again that the proportions do not add up to one as an article may refer to more than one subject category. Table 10 shows that the topics most frequently covered by the agriculture newspapers are production conditions (especially relating to pest, disease and rainfall), advice on growing practices, irrigation and other inputs and prices and markets. There is meagre coverage on the other hand of finance (banking, credit, insurance), government policy and research.

The frequency with which a particular crop is covered in Table 11. The table presents the results for the 10 crops that receive the most coverage and for brinjal. The table shows that some crops do receive considerably more coverage than others. In Gujarat, the three crops that command most press are cotton, groundnut and wheat. In Marathi newspapers, the

coverage is even more concentrated – with most attention for grapes, pomegranate and sugarcane. Groundnut farmers in Gujarat and sugarcane growers in Maharashtra are well known to be organized and politically powerful. Grapes and pomegranate farmers in Maharashtra and cotton growers in Gujarat are situated in regions that are politically influential. In addition, grapes farmers are relatively wealthy, organized with strong connections to exporters. In both states, the media coverage to brinjal does not compare to these commodities.

7. What Can We Conclude

The findings in this paper suggest that the contours of the GM debate follow predictable patterns. Pro-GM opinions typically assert the advantages for farmers (lower costs, higher incomes), favourable agronomic impacts (yield, reduced pests) and the potential to achieve food security. Opinions against GM crops stress negative impacts on health, environment and market structure. Of these the health impacts are the ones most cited.

From the quantum of coverage, the GM news coverage has mainly played out in the English press. Moreover, the English press coverage has been dominated by opinion. It is barely interested in the pragmatic concerns of farmers: about the price and availability of Bt cotton seeds, or the best production practices for Bt cotton. These issues, on the other hand, are the prime concern of Marathi newspapers which cover the GM debate poorly.

These contrasting trends confirm the relative lack of interest among farmers for debating regulation and new crop approvals. On the other hand, they also confirm the interest of growers about the technology in the fields and its pricing. The political strength of growers is demonstrated by the coverage of Bt cotton. Both Marathi and Gujarati newspapers cover the issues relating to the availability and price of Bt cotton seed.

Farmers like price controls and now that they are in place, it could be difficult to get rid of them. A technology that is popular (such as Bt cotton) would be vulnerable to price controls and other means of appropriation (such as illegal seeds) (Ramaswami, Lalitha and Pray, 2012). It would, therefore, seem that of all the arguments that sustain an anti-GM position, farmers

might respond most to the issue of corporate control. That would not be an issue if governments and international donors are willing to buy technologies and price the seeds inexpensively for maximum diffusion.

The media coverage evidence supports the hypothesis that while policy formulation is not inclusive of farmers, the latter have greater voice about existing policies that affect their material interests.

Table 1: Coding of Newspaper Articles

Numeric code	Type codes
1	Op-ed
2	Reporting on opinion of others
3	No opinion or reporting of opinions for both for and against GM crops
Numeric code	Position code
0	Neither pro nor anti-GM
1	Pro-GM
2	Anti-GM
Numeric code	Subject Codes
1	Farmer welfare
2	Agronomy (impact on yields, pests and others)
3	Health (impacts on human and animal)
4	Environment (Impacts on environment including bio-diversity)
5	Corporate control and market structure
6	Regulation
7	Food Security
8	Availability and price of GM seeds
9	Information about pests and diseases of GM crops
10	Information and advice about Bt technology and growing conditions
11	International news about GM crops and regulation
12	Research developments in GM crops
13	Others

Table 2: Distribution of Newspaper Articles Across Years

Year	Frequency	Percentage
2010	177	29
2011	132	22
2012	119	20
2013	178	29
Total	606	100

Table 3: Cross tab between Position and Type Codes

	Op-Ed	Reporting opinion of others	No opinion	Total
Neither pro nor anti-GM	17	26	176	219
Pro-GM	57	104	20	181
Anti-GM	46	142	17	205
Total	120	272	213	605

Table 4: Distribution across languages

Language	Frequency	Percentage
Marathi	104	17
Gujarati	62	10
English	440	73
Total	606	100

Table 5: Distribution across article types (%)

Type	Marathi	Gujarati	English
Op-Eds	24	46	15
Opinions of others	27	18	53
Not Opinion	49	36	32

Table 6: Distribution of Opinions (%)

	Marathi	Gujarati	English
Neither pro nor anti-GM	38	15	6
Pro-GM	42	23	43
Anti-GM	21	61	51

Table 7: Subject content of articles (as % of all articles)

	Subjects	Neither pro nor anti-GM	Pro-GM	Anti-GM
1	Farmer welfare	11.36	23.20	12.68
2	Agronomy (impact on yields, pests and others)	12.73	36.46	13.17
3	Environment (Impacts on environment including bio-diversity)	0.91	8.84	28.78
4	Health (impacts on human and animal)	1.82	16.57	33.17
5	Regulation	34.09	45.86	59.51
6	Corporate control and market structure	4.09	6.63	30.24
7	Food Security	0.45	23.20	6.34
8	Availability and price of GM seeds	29.09	3.31	0.98
9	Information about pests and diseases of GM crops	10.91	2.21	2.93
10	Technology and advise about growing conditions	14.55	1.66	0.98
11	International news about GM crops and regulation	4.55	2.76	1.95
12	Research developments in GM crops	10.45	8.84	2.93
13	Others	5.91	2.21	0.00
	Total number of observations	220	181	205

Table 8: Subject Content by Language (as % of all articles)

Subject Codes	Marathi	Gujarati	English
Farmer welfare	26.92	12.90	12.95
Agronomy (impact on yields, pests and others)	18.27	25.81	19.55
Environment (Impacts on environment including biodiversity)	4.81	17.74	13.86
Health (impacts on human and animal)	6.73	24.19	18.18
Regulation	18.27	30.65	55.00
Corporate control and market structure	8.65	14.52	14.77
Food Security	4.81	3.23	11.14
Availability and price of GM seeds	29.81	19.35	6.59
Information about pests and diseases of GM crops	16.35	8.06	2.73
Technology and advise about growing conditions	25.00	9.68	1.14
International news about GM crops and regulation	7.69	0.00	2.50
Research developments in GM crops	2.88	3.23	9.09
Others	3.85	0.00	2.95

Table 9: Position on GM crops by type of newspaper

	Gujarati & Marathi		English	
	Agriculture newspaper	Other newspapers	Business newspapers	Other newspapers
Neither pro nor anti-GM	61	49	43	22
Pro-GM	29	15	43	28
Anti-GM	10	32	14	50

Table 10: Subject coverage in agriculture newspapers

	Subjects	Marathi	Gujarati
A	Production, pest and disease, rainfall and other natural factors	0.46	0.64
B	Irrigation, availability and price of inputs such as fertilizers, seeds	0.20	0.34
C	Finance including banking, credit, insurance and compensation for damage (in drought and flood)	0.00	0.00
D	Advice on growing practices	0.16	0.55
E	Research news	0.04	0.03
F	Prices and markets including government announcements regarding exports, imports, duties, taxes, tariffs and so on	0.22	0.18
G	Government policy	0.01	0.02

Table 11: Frequency of coverage by crop

Gujarati			Marathi		
Crops	Frequency	%	Crops	Frequency	%
Cotton	120	0.09	Grapes	87	0.15
Groundnut	89	0.07	Pomegranate	50	0.08
Wheat	66	0.05	Sugarcane	49	0.08
Onion	47	0.03	Onion	42	0.07
Cumin	46	0.03	Cotton	41	0.07
Potato	43	0.03	Sorghum	32	0.05
Banana	40	0.03	Rice	31	0.05
Mango	40	0.03	Banana	27	0.05
Rice/paddy	40	0.03	Corn	25	0.04
Sugarcane	35	0.03	Wheat	24	0.04
Brinjal	12	0.01	Brinjal	4	0.01

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End Notes:

¹ Of course, the fact that farmer interests are absent in the debate does not automatically doom GM crops. Herring (2015) explains how precautionary philosophies of risk and uncertainty have undermined official ‘state science’ and regulation.

² This has been noted by others as well. Gentzkow, Shapiro and Stone (2015, pp 5) quote Downs (1957) to say, ““All reporting is biased because the reporter must select only some of the extant facts to pass on to his audience.... Because evaluation begins with emphasis upon—i.e., selection of—certain data in contrast to others, all such selection is evaluative to some extent. In short, there is no such thing as purely objective reporting of any situation or events”

³ Sometimes a pro-GM article might assert a positive impact on health because of a reduction in pesticide use or because of GM crops that are explicitly developed for health impacts such as Golden rice.

4

Most of the time the pro-GM argument was that these GM crops are rigorously tested and are hence safe. Very few articles pointed to possible positive impacts from say lower pesticide use or from traits engineered for nutrition (e.g., Vitamin A).