CWS/WP/200/60

Urgent Need for Market Access Disciplining of AgricultureTrade:

Profiling of Stringent and Non-Codex SPS based MRL Standards

Dr Murali Kallummal
Ms Hari Maya Gurung

CWS Working Paper 60
August 2020

Centre for WTO Studies (CWS), CRIT
Indian Institute of Foreign Trade

Urgent Need for Market Access Disciplining of Agriculture Trade:

Profiling of Stringent and Non-Codex SPS based MRL Standards [*]

Murali Kallummal
Hari Maya Gurung[†]

Abstract

The world trade organisation (WTO) has liberalised trade considerably, but there are instances of imbalance and systemic issues persisting although we celebrate two-decade of the existence of this regulatory body. This paper provides insights into how there is a lack of disciplining of WTO compatible non-tariff measures at the multilateral level.

It has led to members stretching the use of permissible provisions (Articles 5 and 7) under the sanitary and phytosanitary (SPS) agreement, allowing for deviation from international standards and not notifying with HS codes. All these actions, particularly over the last two decades, have increased the level of protection of their domestic industry under pressure from tariff liberalisation and correspondingly led to a rise in protectionism. Especially when the restrictions put on the imports, they are not adequately notified to the WTO. Information asymmetry (of various forms like – the WTO notifications without trade linkage, non-standardised approach to market access, non-codex MRL standards etc.,) is one of the biggest challenges to overcome when it comes to addressing the menace of non-tariff measure created mainly by the SPS and TBT measures.

This paper attempts to bring to the forefront some of the imbalances in the global trading arena that have co-existed along with the WTO led tariff alone liberalisation efforts since 1995. To do this, we have analysed ten players in the global arena, considering various strategic consideration for India. In the paper, we have attempted to bridge this by providing what exactly is the level of requirements across ten countries in terms of active ingredients MRL standards. To elaborate on this issue, we have done the mapping of maximum residual limits (MRL) standards on active ingredients as provided by the Global MRL Database for ten countries alongside Codex standards (international). An analysis of the stringency test performed to quantify a comparison MRL standards scenario vis-à-vis the Codex standards for ten countries.

The paper highlights the growing importance of MRL standards on active ingredients in determining global players in agricultural exports. This paper also analyses the MRL standards faced by top 33 agricultural products of India in nine markets. Further, there is an attempt to analyse the interface of tariff liberalisation (MFN) with MRL-based SPS standards, which are dominantly present "behind the border".

---

[*] This is a modified version of the working paper, which was written in 2017.

[†] The authors are Professor and Research Fellow at the Centre for WTO Studies, Indian Institute of Foreign Trade, New Delhi. Views expressed are purely personal and does not in any manner associated with the Institution. The authors would like acknowledge Prof. Abhijit Das (Head) for his instinctive support and valuable comments.

Table of Contents

List of Tables

List of Figures

Urgent Need for Market Access Disciplining of Agriculture Trade:
Profiling of Stringent and Non-Codex SPS based MRL Standards

1. Introduction

Considerable liberalisation and disciplining of rules have happened under the eight rounds of global multilateral negotiations since 1947; under both General Agreement on Tariff and Trade (GATT's) and World trade organisation (WTO). The Uruguay Round itself undertook some of the most ambitious commitment levels across 123 members in 22,500 pages – listing individual country's commitments on specific categories of goods and services - it was an extremely onerous commitment for a single member with the limited number of negotiators. Market access for goods is one of the issues amongst various other disciplines and commitments. Mainly negotiated under two committees — the committees on agriculture goods and non-agriculture goods (NAMA).

Goods market access under the WTO meant having the schedule of commitments on tariff and non-tariff measures, as agreed by individual members at the time of entry, and these were specific to goods only. The commitment on the tariffs is indicated in the goods schedule of concession. The schedules represent commitments not to apply tariffs above the listed rates otherwise called as "bound rates". It also includes commitments to cut tariffs and to "bind" their customs duty rates on imported goods - in some cases, tariffs are being eliminated or reduced to zero.

Separate WTO Agreements covered the market access issues on non-tariff measures (NTMs) like the sanitary and phytosanitary (SPS), technical barriers to trade (TBT), rules of origin (RoO), customs valuation, subsidies and countervailing duties etc. Achieving the Uruguay Round initiated aspirations, there is a need to reduce all forms of barriers (tariffs, NTMs, and behind-the-border), with a firm commitment to a high degree of transparency and coordination. Therefore, there was a need for parallel efforts to liberalise all market access barriers.

However, in the case of the agricultural tariff, the schedule of tariff concessions of each WTO Member reveals the extent of tariff concessions offered. Such agreed concessions formed an integral part of Uruguay Round results. For each agricultural product, the schedule sets out clear outlines like maximum tariff that is applied on imports into the territory of the Member. The tariffs in the schedules included those that resulted from the

tariffication process.[3] Many developing countries bound their previously unbound tariff lines at the 'ceiling binding', *i.e.* at levels much higher than the actual applied rates.

The primary objective of this paper is to reveal information on the SPS based MRL standards applied by different WTO member countries. Further, the sub-objectives are:

1. To highlight the imbalance in the disciplining of tariff and non-tariff measures;
2. To create similarity of information availability of SPS based MRL standards;
3. To analyse the stringency across ten selected member countries of WTO from the international Codex standards;
4. To analyse the presence of non-Codex standards across the ten selected member countries.

The second and third objectives will be analysed using simple tools like simple averages, composition analysis, calculation of percentages and ratios & deviations in terms of times.

Section I

2. Tariff Disciplining Under Agreement on Agriculture (AoA)

The core objectives of the agriculture agreement are to reform trade in the sector and to make policies more market-oriented. Further, to improve predictability and security for importing and exporting countries alike by applying rules and commitments. Three areas of discipline guided the same:

1. Market access — various trade restrictions confronting imports;
2. Domestic support — subsidies and other programmes, including those that raise or guarantee farm gate prices and farmers' incomes;
3. Export subsidies and other methods used to make exports artificially competitive.

The agreement does allow governments to support their rural economies, but preferably through policies that cause less distortion to trade. It also

[3] A process of UR wherein the quotas where replaced with tariff rates using ceiling bound rates.

allows some flexibility in the way commitments are implemented. Developing countries do not have to cut their subsidies or lower their tariffs as much as developed countries. Further, the S&D provides for additional time to meet the obligations for developing countries. Special provisions deal with the interests of countries that rely on imports for their food supplies, and the concerns of least-developed economies.[4]

The tariff disciplining under the AoA happened largely through the 'tariffication package', which meant that the members were required to maintain current import access opportunities at levels corresponding to those existed during the 1986-88 base period. There was the progressive expansion of minimum access requirements from 3 per cent and further to expanded to reach 5 per cent in the year 2000 (developed country Members) or 2004 (developing country Members). The trust of minimum access opportunities led to the conversion of quotas to form tariff quotas in many countries. All these indicated the limitations of the tariffication process under the WTO with only minimum market access commitments, which the developed countries agreed to under the Uruguay Round.

The vast majority of tariff quotas in agriculture have their origin in the Uruguay Round negotiations, and several such commitments were the result of accessions to the WTO. Currently (July 1999), 37 Members have tariff quotas specified in their schedules. In total, there are 1374 individual tariff quotas. These tariff quotas constitute binding commitments as opposed to autonomous tariff quotas, which Members may establish at any time, for example, to stabilise the domestic price after a poor harvest.

Further, the Agreement on Agriculture (Article 4.2) prohibits the use of agriculture-specific non-tariff measures. Such measures include quantitative import restrictions, variable import levies, minimum import prices, discretionary import licensing procedures, voluntary export restraint agreements and non-tariff measures maintained through state-trading enterprises. All similar border measures other than "normal customs duties" are also no longer permitted. Further, the Article 4.2 of the Agreement on Agriculture does not prevent the use of non-tariff import restrictions consistent with the provisions of the GATT or other WTO agreements that apply to traded goods generally (industrial or agricultural).

[4] See https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm3_e.htm

The market access barriers include those measures maintained under balance-of-payments provisions (Articles XII and XVIII of GATT), general safeguard provisions (Article XIX). Other related WTO agreements are the general exceptions (Article XX of GATT), further using the provision of Article XX Agreement two other agreements like the Sanitary and Phytosanitary Measures[5], the Agreement on Technical Barriers to Trade. All possible domestic policy barriers as listed in UNCTAD 2012 report under 14 broadheads.[6]

WTO Members continued to seek advancement in market access through regular WTO work programme and through negotiations under Doha Ministerial Conference launched in November 2001. There was considerable progress in tariff negotiations based largely on autonomous efforts of countries.[7] The WTO agreement on agriculture (AoA) proposes to create fair trading markets across the World by addressing all kinds of barriers, both direct and indirect. The truth is that not much movement towards liberalisation achieved in terms of second and third pillars of AoA, i.e., domestic supports and export subsidies.

In the next section, we would be tracing how in market access excessive disciplining and harmonisation occurred from 1995 but only limited to applied ad-valorem tariffs on imports.

2.1. Ad Valorem Tariff Negotiation

The agricultural tariff lines are disciplined by increasing the coverage of tariff lines with tariffs and by the elimination of applied tariff down to zero for some products. Uruguay Round focused on agricultural products with tariff lines having a bound coverage of 100 percent for developed and developing countries. Based on the observation, two types of WTO bindings in the agricultural sector, the first the developed countries (mostly) which use the terminology of 'bound' tariff lines (having tariff lines under both Ad

---

5 The text of the Punta del Este Ministerial Declaration states, with respect to agriculture, that "Negotiations shall aim to achieve greater liberalization of trade in agriculture and bring all measures affecting import access and export competition under strengthened and more operationally effective GATT rules and disciplines, taking into account the general principles governing the negotiations, by: ….(iii) minimizing the adverse effects that sanitary and phytosanitary regulations and barriers can have on trade in agriculture, taking into account the relevant international agreements". http://www.fao.org/docrep/003/x7354e/X7354e01.htm#TopOfPage.

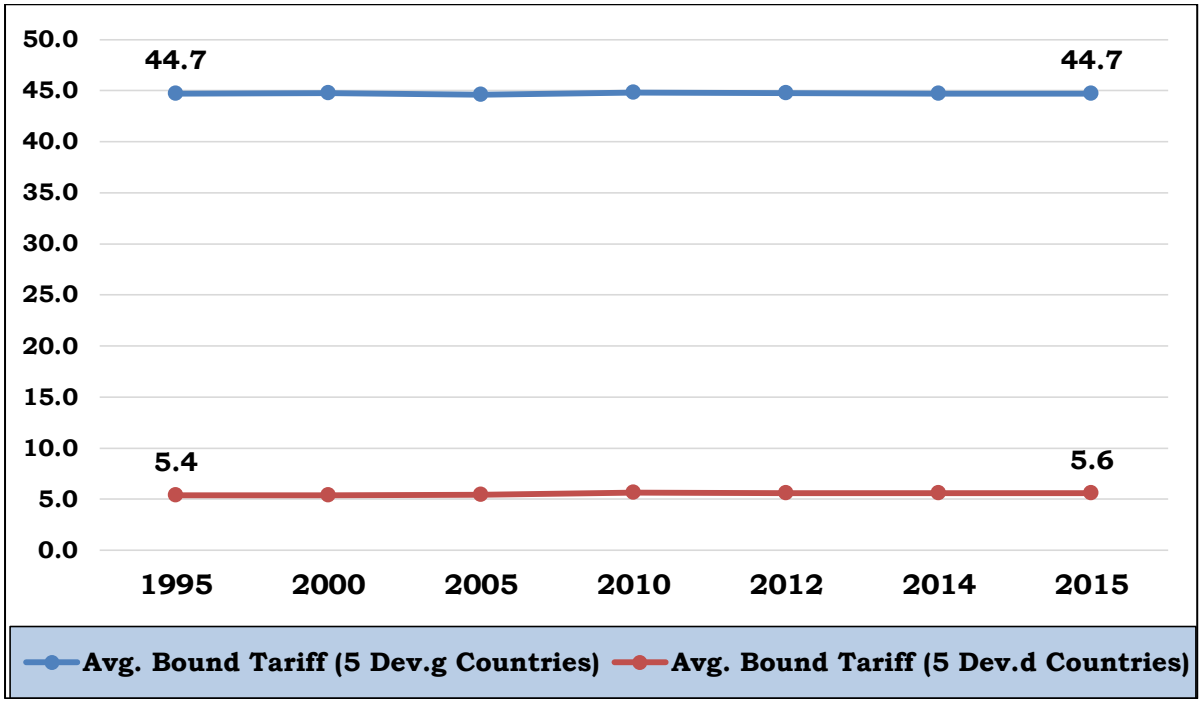
6 UNCTAD, 2012, "Classification of Non-Tariff Measures", https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=299

7 See Figure 1 (Evolution of average tariff rates in developing nations) as in page 1 of Richard Baldwin, 2010, "Unilateral tariff liberalisation", Graduate Institute, Geneva, November. http://www.econ.hit-u.ac.jp/~cces/COE2010_HP_20101006/paper/richard_baldwin.pdf.

valorem and non-Ad valorem terms), and the second type is the 'ceiling binding' for countries with a significant share of Ad-valorem tariffs.

In case of the bound tariff, the average bound tariff rate for developing countries remained at 44.7 percent while we can see developed countries having 0.2 percentage points increased from 5.4 percent in 1995 to 5.6 percent in 2015. One of the main factors is the unsettled negotiation on Ad Valorem Equivalents (AVEs). Further, the gap is because of the S&D treatment, and the other flexibilities agreed to under the UR.

Figure 1: Average Bound Tariff on Agricultural Products (Avg.)



Source: WITS Comtrade as on 06-10-2016

Taking the economic status into consideration, figure 1 has analysed developed and developing countries. Figure 1 suggests bound tariff rates did not show any reduction from the date of establishment of the WTO – therefore we are still operating at the levels of Uruguay Round. Fifteen years of negotiations have not yielded any reduction in bound tariff rates of members. Indicating that there was no mandatory requirement (Doha Round) to liberalise tariffs under the multilateral forum like the WTO.

On the other hand, the levels in the applied tariff rates determined the market access and liberalisation initiated by the WTO members. Increase in the effectiveness of market access is possible at lower applied MFN tariff by reducing or elimination of applied MFN tariffs. Table 1 and figure 2 indicates the trends in the average applied MFN tariffs of selected ten countries. In the case of developing countries, table 1 reveals that the

simple average ad valorem MFN applied tariff decreased by 9.2 percentage points from the high of 17.3 percent in 1990 to 8.1 percent in 2015. On the other hand, in developed countries, the applied tariffs decreased only by 5.0 percentage points from a high of 10 percent in 1990 to 5 percent in 2015. MFN applied tariff rates in the developing countries had very high quantum of autonomous liberalisation in comparison to the developed counterpart - seen in the reduction of ad-valorem terms alone. The differences across MFN tariff in the agricultural sector of developed and developing countries are shrinking over the two decades.

Table 1: Average Simple MFN Tariffs of Agricultural products – 6 digit HS codes

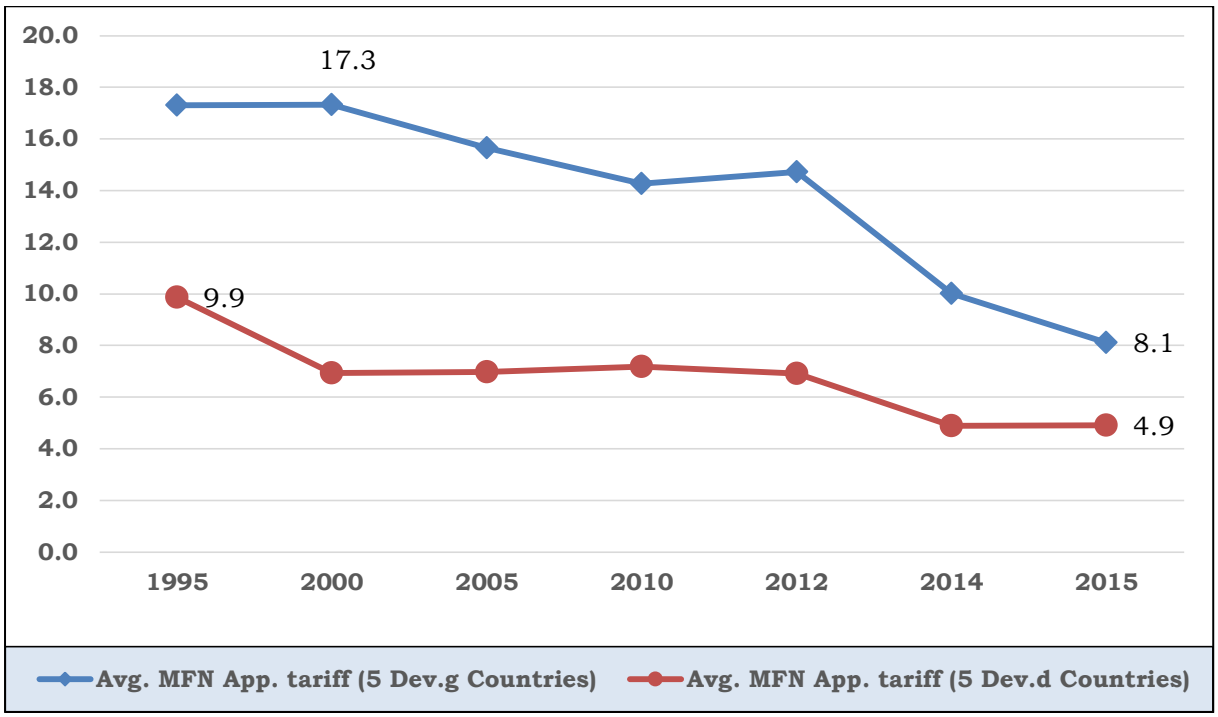
Countries	1995	2000	2005	2010	2012	2014	2015	Drop in Tariff rates over 1995
Chile	11.0	9.0	6.1	6.1	6.0	--	6.0	5.0
Malaysia	**2.6**	2.6	2.4	2.4	2.4	2.6	--	0.0
Mexico	13.5	23.7	21.7	20.8	21.0	17.3	--	13.5
India	**38.4**	38.4	37.7	31.6	33.7	--	--	4.7#
Brazil	9.9	12.9	10.3	10.5	10.5	10.2	10.2	-0.3
Avg. MFN App. tariff (5 Developing Countries)	**17.3**	**17.3**	**15.7**	**14.3**	**14.7**	**10.0**	**8.1**	**9.2***
Australia		1.2	1.1	1.2	1.1	1.1	1.1	0.1
Canada	16.4	13.2	13.1	13.3	12.9	3.1	3.1	13.3
European Union	8.6	6.0	6.2	6.4	6.2	6.1	6.1	2.5
Japan	9.0	7.4	7.4	7.8	7.4	7.1	7.1	1.8
United States	5.6	6.9	6.9	7.3	7.1	7.1	7.1	-1.5
Avg. MFN App. tariff (5 Developed Countries)	**9.9**	**6.9**	**7.0**	**7.2**	**6.9**	**4.9**	**4.9**	**5.0**

Note: # = where 1995 or 2015 tariff is not available the nearest year taken for estimation.
Source: WITS Comtrade as on 06-10-2016.

Developing countries showed significant drops in agricultural applied MFN tariffs. A prime example is Mexico showing a drop in MFN tariff up to 14 percentage points from a high of 23.5 percent in 2000 to 17.3 percent in 2014. Chile, with five percentage points, drops from 11 percent in 1995 to 6 percent in 2015. However, Brazil showed stickiness in MFN tariff rates with a negative 0.3 percentage points with MFN applied tariff remaining in the range of 9.9 percent to 10.2 percent.

Malaysia operating under the ASEAN free trade agreement[8] had very low MFN tariffs of 2.4 percent in agricultural products. Indian MFN tariff was the highest across the five developing countries, in the case of agricultural products there was a marginal drop from 38 percent in 2000 to 33.4 percent in 2012. Therefore, the agricultural sector witnessed a very high level of protection in India.[9] In general, the average MFN applied agricultural tariff across the developing countries had decreased substantially, thereby suggesting greater market access in agricultural products.

Figure 2: Average Simple MFN Tariff on Agricultural Products (Avg.)



Source: WITS Comtrade as on 06-10-2016

Applied MFN tariff reductions in the agricultural sector for the developed countries are relatively lower when compared with the developing countries. The developed countries MFN applied tariff decreased by 5.0 percentage points in twenty-five years (1990 to 2015). In the case of agricultural products, the United States increased by two percentage points from 5.6 percent in 1995 to 7.1 percent in 2015. Canada has had the sharpest fall in MFN tariff with 13.3 percentage points, with tariff rates falling from 16.4 percent in 1995 to 3.1 percent in 2015. Rest of the three countries in the

[8] ASEAN free Trade Agreement (AFTA) was signed on 28 January 1992 in Singapore and ASEAN had originally six members, namely, Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand. Vietnam joined in 1995, Laos and Myanmar in 1997 and Cambodia in 1999. AFTA now comprises the ten countries of ASEAN.

[9] Francis Smitha and Kallummal Murali (2013), "*India's Comprehensive Trade Agreement: Implications for Development Trajectory"*, Special Article, Economic and Political Weekly, v 48 (31), pp August.

developed group also showed decreasing MFN tariff, and these are EU with 2.5 percentage points followed by Japan with 1.5 percentage points and the lowest for Australia with 0.1 percentage points.

A couple of factors mainly drove reductions in MFN tariffs across developing countries: 1) the expectations from the impending cut in the bound rates and its pressures on tariff overhang out of Doha Round, and 2) the various regional harmonisations on tariffs undertaken under regional trade agreements. As seen in North America Free Trade Agreement (NAFTA)[10], the customs union of MERCOSUR[11] and Association of South-East Asian Nations (ASEAN)[12] and India-ASEAN FTAs - the trade liberalisation was synonym to average tariff reductions across WTO membership. There were distinctions in the treatment of agricultural *vs* non-agricultural sectors. Avoiding shocks to the domestic economy from compliance to Doha bound commitments (bound tariff) was the primary concern for many developing countries. The developing countries observed two distinct trends in the agricultural and non-agricultural sectors. The non-agricultural sector that agreed to take a line-by-line approach using the Swiss formula witnessed significant tariff reductions.[13] The agricultural sector, which agreed for the three-tiered approach, saw stickiness tariff reductions. Doha Round differences were not solely on account of the differences in the treatment of binding, and the negotiations in the reduction of it, but also due to many other non-trade concerns like food security, food safety and environmental reasons.

2.2. Unfinished Agenda of Ad Valorem Equivalences (AVEs)

One of the unfinished agendas of the AoA negotiation of the Doha Round has been the task of Ad Valorem equivalents (AVEs). The literature on the issue of ad valorem equivalent negotiations is sparse, and its impact on the market access process is even sparser in the context of WTO. It does not mean that it is not important for the tariff disciplining under the Doha Round. Meaningfully application of the three-tiered-approach would necessitate a large number of tariff lines in the developed countries with

[10] NAFTA has three members that included United States of America, Canada and Mexico.

[11] Mercosur is a full custom union with 10 member countries like, Argentina, Brazil, Paraguay, Uruguay and associate countries are Bolivia, Chile, Peru, Colombia, Ecuador and Surinam with two observer countries New Zealand and Mexico.

[12] ASEAN grouping has 10 members Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Cambodia, Laos, Myanmar (Burma), and Vietnam.

[13] Applied on line-by-line basis for achieving a higher reduction commitment.

non-ad valorem duties to be converted to ad valorem equivalence (AVEs) (Babili 2009).[14] The issue of overall tariff disciplining of AVEs is a major area of concern. Many developed countries apply specific duties, and by doing so, it rendered unaccountable for calculation of simple average tariffs as only those lines with ad valorem tariff. Therefore, for the aggregation purposes, these tariff lines are must, and AVEs are to replace the specific duties and non-ad-valorem tariffs. In the case of the tariff, the WTO negotiations can never achieve a balanced outcome without a negotiated deal on AVEs.

Kallummal (2015) had established that developing countries maintained a significantly lower number of tariff lines in the forms of NAV/specific duties.[15] Therefore, the simple average of developing countries is relatively more reflective of the actual market access for agricultural products. On the other hand, the developed countries maintain a high level of non-quantifiable tariffs - the shares of which are significantly high and without the inclusion of such tariff lines in aggregation can lead to unfair comparison with developing countries. As the ad valorem equivalents (AVEs), the tariff can alter (raise) the final simple averages in the case of developed countries, non-inclusion of such tariff lines will not reflect the actual market access conditions prevailing in the developed markets in terms of tariff-alone comparison.

Table 2 reveals that even in 2014, the extent of NAV duties in agricultural products continues to remain to be sorted at the WTO negotiations. Sections 1 to 4 covering agriculture and allied sectors (A&AS) indicated the extent of coverage of non-ad valorem usage across the five developed countries in 2014. It suggested the high prevalence of duties in the form of NAV continued to remain an important challenge for market access negotiation in the Doha round for AoA.

---

[14] Babili Mahmoud (2009), "Ad Valorem Equivalent in the WTO", NAPC Working paper no 43, Ministry of Agriculture and Agrarian Reform, National Agricultural Policy Center, December, http://ageconsearch.umn.edu/bitstream/48586/2/43_ad_valorem_mb_en.pdf

[15] Kallummal Murali (2015), "North–South Imbalances in the Doha Round: The Use of Specific Duties as a Trade Policy Instrument", Agrarian South: Journal of Political Economy, 4(1), pp 85–124, DOI: 10.1177/2277976015574052.

Table 2: Summary Table on the Usage of Non-Ad Valorem (NAV) Tariff in Developed Countries – 2014

Section	Section Description	2014 (Total number of Tariff Lines and Non Ad Valorem (NAV) tariff % to Total TLs)													
		Switzerland		Australia		New Zealand		EU-27		Japan		USA		Canada	
		Total TLs	% of NAV TLs	Total TLs	% of NAV TLs	Total TLs	% of NAV TLs	Total TLs	% of NAV TLs	Total TLs	% of NAV TLs	Total TLs	% of NAV TLs	Total TLs	% of NAV TLs
1	Live animal and animal products	576	*67.4*	339	*1.5*	378	*0.0*	932	*40.7*	795	*9.7*	805	*31.1*	477	*24.9*
2	Vegetable products	1174	*79.9*	314	*0.0*	337	*0.0*	553	*37.2*	645	*11.4*	656	*44.3*	493	*26.1*
3	Ani. or veg. fats and oils and veg. waxes	197	*64.0*	49	*0.0*	61	*0.0*	128	*9.4*	95	*75.9*	171	*48.6*	70	*2.9*
4	Prep. foods, beverages & mfg. tobacco. subs'	674	*82.6*	287	*1.4*	527	*0.8*	832	*87.8*	865	*17.2*	882	*37.8*	592	*26.8*
I. Agricultural and Allied Sectors		**2621**	***73.5***	**989**	***0.7***	**1303**	***0.2***	**2445**	***43.8***	**2400**	***28.6***	**2514**	***40.5***	**1632**	***20.2***
5	Mineral products	183	*33.9*	198	*0.0*	213	*0.0*	234	*1.3*	265	*18.3*	283	*19.5*	158	*0.0*
6	Chemical or allied industries	1017	*60.0*	873	*0.0*	951	*0.0*	1149	*2.4*	1450	*0.4*	1450	*0.7*	879	*0.5*
7	Plastics and rubber articles thereof	241	*87.6*	238	*0.0*	389	*0.3*	301	*0.0*	352	*1.7*	354	*0.0*	302	*0.0*
8	Raw hides and skins, leather	74	*79.7*	92	*0.0*	102	*0.0*	130	*0.0*	227	*0.0*	227	*0.5*	98	*0.0*
9	Wood and articles of wood	131	*88.5*	143	*0.0*	206	*0.0*	213	*0.0*	265	*0.0*	265	*2.1*	133	*0.0*
10	Pulp of wood or paper or paperboard	178	*86.5*	283	*0.0*	221	*0.0*	195	*0.0*	166	*0.0*	166	*0.0*	141	*0.0*
11	Textiles and textile articles	1090	*96.9*	911	*0.0*	1045	*0.4*	1159	*0.1*	1977	*12.1*	1989	*6.9*	1246	*0.0*
12	Footwear, umbrellas, art. of human hair	60	*100.0*	60	*0.0*	105	*0.0*	106	*0.0*	128	*24.3*	152	*13.3*	100	*0.0*
13	Articles of stone, plaster, glass and glassware	159	*98.7*	161	*0.0*	225	*0.0*	236	*3.1*	163	*0.0*	163	*2.3*	168	*0.0*
14	Nat. pearl, precious metals, imitation Jewellery	61	*88.5*	53	*0.0*	68	*0.0*	56	*0.0*	79	*0.0*	79	*0.0*	60	*0.0*
15	Base metals and articles of base metal	906	*95.7*	583	*0.0*	798	*0.0*	953	*0.0*	844	*4.6*	848	*4.9*	669	*0.0*
16	Mach.; electrical equipment; parts thereof;	1236	*83.3*	953	*0.0*	1179	*1.4*	1375	*0.0*	918	*0.0*	918	*0.3*	1056	*0.0*
17	Vehicles, aircraft, transport equip.	195	*90.8*	238	*3.5*	232	*0.4*	269	*0.0*	145	*0.0*	145	*0.0*	238	*0.0*
18	Optical, photocopy, med. Instruments & app.	251	*78.1*	240	*0.0*	234	*3.4*	322	*6.6*	271	*0.0*	271	*22.3*	289	*0.0*
19	Arms and ammunition	26	*100.0*	19	*0.0*	32	*6.3*	22	*0.0*	22	*0.0*	22	*12.1*	29	*0.0*
20	Miscellaneous manufactured articles	176	*80.7*	144	*0.0*	200	*1.0*	208	*0.0*	189	*1.1*	190	*7.3*	197	*0.0*
21	Works of art, collectors'	10	*20.0*	7	*0.0*	7	*0.0*	7	*0.0*	7	*0.0*	7	*0.0*	9	*0.0*
II. Manufacturing Sector		**5994**	***80.5***	**5196**	***0.2***	**6207**	***0.8***	**6935**	***0.8***	**7468**	***3.7***	**7529**	***5.4***	**5772**	***0.0***
Total NAV Tariff Lines		**8615**	***81.1***	**6185**	***0.3***	**7510**	***0.5***	**9380**	***11.8***	**9868**	***6.9***	**9875**	***10.0***	**7404**	***5.0***

Note: TLs is tariff lines and is represented as absolute numbers, and NAV is non-ad valorem represented as percentages share to total TLs.
Source: Author calculations based on Tariff Analysis Online (TAO), IDB data extracted on December 10 2016.

In the five developed countries with very low average applied MFN tariffs (ad-valorem terms), it is found that all the five maintained a significant number of tariff lines in NAV/specific duty terms.[16] The NAV tariffs maintained by Switzerland was the highest with 73.5 per cent of the 2,621 total Agricultural and allied tariff lines[17] (A&ATL), followed by the European Union with 44 percent of total 2,445 A&ATL. Three other countries followed behind with the United States at 41 percent share of the total 2,514 A&ATL; Japan with 29 percent share of total 2,400 tariff lines; Canada with 20 percent share of total 1,632 A&ATL were other developed countries with relatively high NAV shares. However, Australia and New Zealand had very low shares like 0.7 percent and 0.2 percent of NAV tariff lines to total agricultural and allied tariff lines.

Highest NAV tariffs are present in prepared foods, beverages and manufactured tobacco substances (Section 4 - Chapters 16 to 24) for two developed countries; the European Union with 88 percent share in total tariff lines[18] of 832 and Switzerland with 83 percent share in 674 tariff lines. Suggesting that in these two economies, the market access for processed food products is opaque as the NAVs discourage cheaper imports, thereby indirectly encouraging domestic value addition. The United States, with 38 percent share out of the total tariff lines of 882, clearly indicated that in comparison to EU, it is lower in terms of the usage. Latter with the similar number of tariff lines had very high NAV usage of 88 percent share. The other prominent users of NAV tariffs were Canada with 27 percent share and Japan with 17 percent share of NAV in the tariff lines of 592 and 865 respectively.

The EU has 41 percent NAV share with 932 tariff lines in the live animal and animal products (sections 1) which has second-highest NAV tariffs and following it are the vegetable products (section 2) with 37 percent share out of 553 tariff lines. In the case of US topmost NAV share is in animal or vegetable fats and oils and vegetable waxes (section 3) with 49 percent shares in 171 tariff lines and at the second highest is in vegetable products (section 2) with a share of 44 percent out of 656 tariff lines.

The third Quad country in terms of NAV presence in Japan with an overall share of 29 per cent in A&AS. Like the US, Japan too had very high NAV

16 Kallummal Murali (2015), ibid.
17 Agricultural sector in this section has coverage of chapters 1 to 24.
18 Includes both tariff lines with ad valorem tariffs and non-ad valorem tariffs.

share of 76 percent of tariff lines in animal or vegetable fats and oils and vegetable waxes (section 3). The other significant section is vegetable products (section 2) with 11 percent NAV shares of the total 645 tariff lines. Japan had the lowest NAV share of 10 percent in animal and animal products (section 1).

Besides very high NAV of 27 percent share in the processed food section, Canada also maintains a considerably high share of NAV tariff lines in live animals (25 percent) and vegetable products (26 percent). Switzerland maintains NAV shares of above 60 percent of the tariff lines across all the three sections.

Developed countries pattern of usage in the NAV duties indicated that there is a lot of unfinished tasks even in tariff harmonisation. However, keeping aside this imbalance owing to other imbalances like ambition levels between agriculture, non-agriculture and domestic supports issues the Doha Round came to the point of gridlock with no movement forward. It is important to highlight that both groups find themselves at the lowest point of negotiating capital – one with the lowest tariffs and other with low "levels/scope" for application of NTMs like sanitary, phytosanitary (SPS) and technical barriers to trade (TBT) measures. Therefore, developed and developing countries could not come to a consensus on many of these issues.[19]

Section II

3. Global Practices in the Application of SPS Measures

Globally the NTMs have been on the rise when tariff have been decreasing in applied MFN tariffs. This subsection derives shreds of evidence from the notified SPS measures of the 164-member countries to the WTO and its potential trade impact in terms of products coverage[20]. The analysis shows that since 1995 the SPS notifications to the WTO have increased with 13 percent growth rate.[21] The notifications have increased for both developed

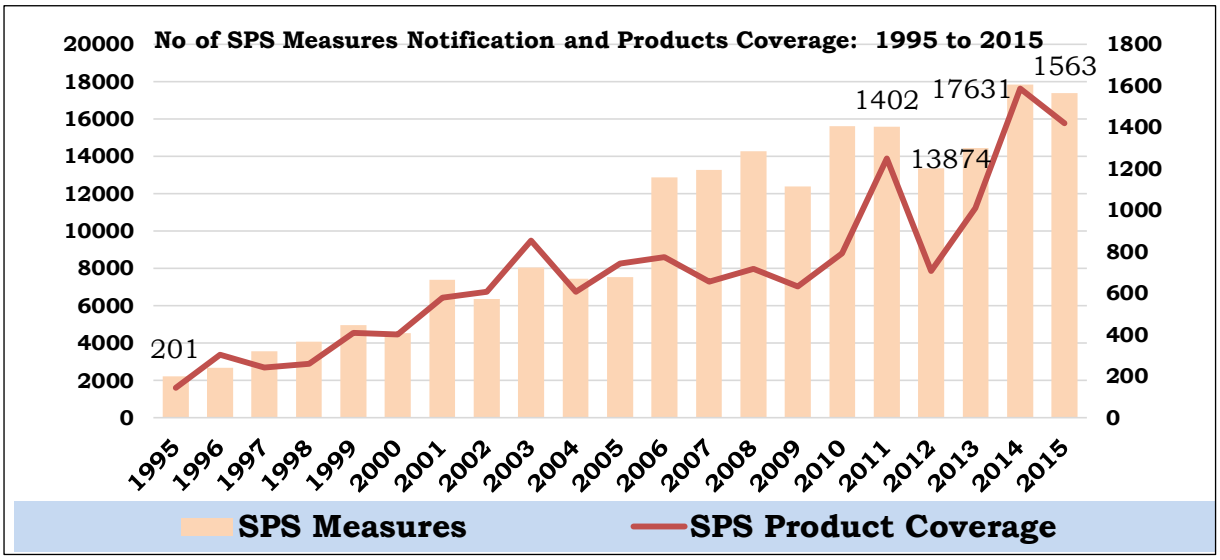
[19] Draft texts of December 2008, 'NAMA modalities' and 'Revised draft modalities for NAMA, https://www.wto.org/english/tratop_e/markacc_e/guide_dec08_e.htm; Agriculture text - https://www.wto.org/english/Tratop_e/agric_e/chair_texts08_e.htm.

[20] Single notification can regulate a single product or multiple products depending upon the scope and nature of the objective. For example regulations that authorise feed product based on the use of Lactobacillus diolivorans DSM 32074 as a feed additive will have a limited minimal impact, could be single product (see G/SPS/N/EU/199, dated February 24, 2017), on the other hand, the regulation providing for nutritional additives that contain iron (Fe+2) in a unit-dose child-resistant packaging could have a much wider impact in product terms (see G/TBT/N/ISR/942, dated February 24 2017) this notification can impact Sections 1 to 24 or Chapters 1 to 24.

[21] Total SPS notification includes all notifications that are under additions, revision and corrigendum.

and developing countries. Of the 18,490 total notifications from 1995 to 2015, the developed countries accounted for 43 percent shares, and developing countries had 57 percentage shares. In terms of product coverage, the growth rates of SPS notifications is 7.9 percent when compared to TBT notifications' product coverage of 2.5 percent.

Figure 3: SPS Notification made to the WTO by 164 Members



Source: Centre for WTO Studies, Web Portal on SPS and TBT measures.

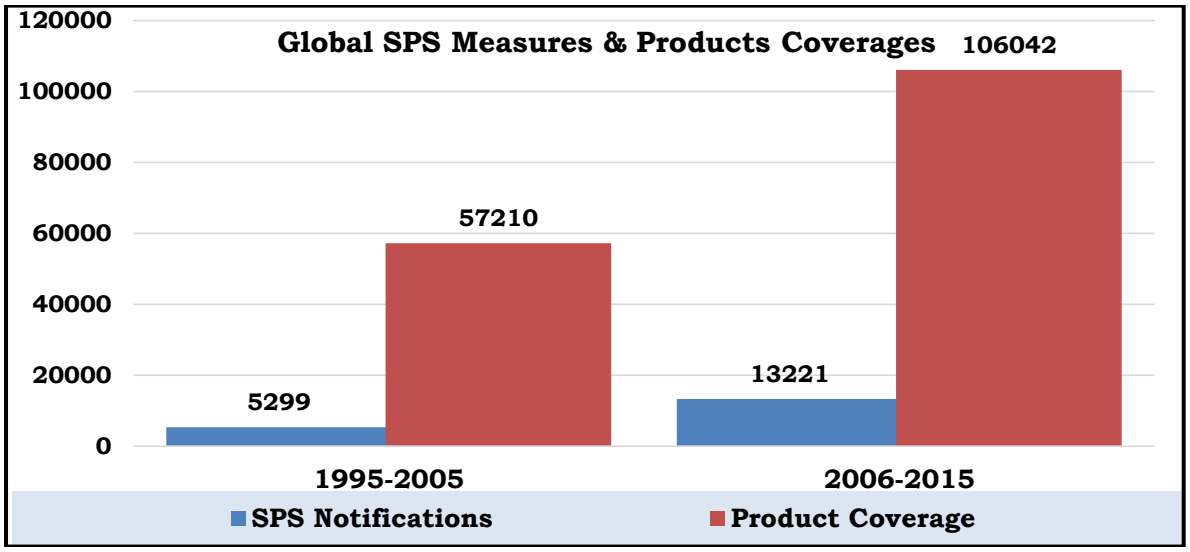
Figure 3 suggests that the SPS notifications to WTO by the members from 201 in 1995 to 1,563 in 2015. There is no certainty that all the SPS measures, as notified to the WTO, does provide products linkage as observed in the case of tariff rates In terms of tariff lines it does provide the exact tariff and therefore the assessment on market access is possible, but the same is not true for the SPS measures. In the case of NTMs (like SPS and TBT measures), such direct association in terms of tariff lines is often missing in the actual notification to the WTO. The imbalance in the negotiation has been addressed to some extent by the online web portal of Centre for WTO Studies on SPS and TBT measures, and now the policymakers and researcher can use the same to look of barriers at 4 digit HS level.[22]

This paper has attempted to provide a bifurcated analysis of the total period of 20 years into two equal phases, as shown in figure 4. The centre's web portal on SPS measures allows us to understand the implication of these measures in terms of tariff lines at the harmonised system (HS) 4-digit level.

Figure 4: Bifurcated Analysis of SPS Notifications: (1995-2005 and

[22] The online databases are, for SPS measures < http://cc.iift.ac.in/sps/index.asp> and TBT measures < http://cc.iift.ac.in/tbt/index.asp>.

2006-2015)



Source: Centre for WTO Studies, Web Portal on SPS and TBT measures.

The Figure 4 reveals that 5,299 notifications during the period of 1995–2005 had a tariff line coverage of 57,210 products at HS 4-digit, this increased in the next phase of 2006–2015 to 13,221 notifications with 1,06,042 tariff line coverage at HS 4-digits.

Thereby, suggesting that the increased importance of transparency obligations that has attained even more in the later period (2006 to 2015) - with the notifications on non-tariff measures (both SPS and TBT measures). The WTO has conditions of transparency obligations for tariff and non-tariff measures (NTMs) upon the members for market access. The transparency obligations were viewed and monitored differently, under the many agreements of WTO, leading to the systemic issues in the WTO. It is completely true for the tariff-related market access issues where disciplining related information are available in 'relatively' transparent manner. In the case of SPS and TBT Measures, the same cannot be true. Close to 80 percent of the notifications made under the SPS and TBT measures by members are without HS codes (Kallummal 2007, 2012). Therefore, direct comparison of market access conditions is not possible by the many academicians, policymakers or small private players and exporters.

Besides the many systemic challenges[23,24], the other dimension of the use of SPS measures are high in the existing legal provisions that allowed members

[23] WTO, (2008), Note by the Secretariat of the Committee on Sanitary and Phytosanitary Measures, ***Workshop on Transparency held on 15-16 October 2007***, G/SPS/R/47, 8 January 2008.

[24] WTO, 2007, "Compilation of Proposals Regarding the Revision of the "Recommended Procedures for Implementing the Transparency Obligations of the SPS Agreement (ARTICLE 7)", Committee on Sanitary and Phytosanitary Measures, G/SPS/W/215, 8 October 2007.

to have deviated standards. Such deviated standards often are national legislation used to regulate imports and may have higher technological content.[25] Article 5 of the SPS Agreement provides for which prescribes the route of risk assessment as the basis for such national standards. Further, under the same Article sub-point 7 in the absence of risk assessment, a country can take a measure based on hazard (precautionary principle) however the application of such measures are temporary and shall undergo revision/withdrawal in a reasonable period.

In conjunction with the transparency issues led to a surge in SPS measures, the weakness of the market access negotiation is that there was no parallel evaluation of the progress in NTMs. Often such measures go undetected since most of the products with such NTMs are difficult to quantify or sometimes not quantifiable although they look like WTO compatible measures. These only get investigated in specific cases for violation of the SPS agreement provisions. Most often, investigated for the single crop analysis and therefore missed the overall impact of market access for agricultural products. Such an exercise requires a considerable amount of public availability of information (similar to the tariff discipline or sometimes more) to help in the identification of SPS standard and its trade links (HS code). Information on the deviated standard would need to be systematically updated by members, specifically the dossier on the procedures followed for assessment of risk and scientific justifications.

3.1. MRL Deviations and Stringency

SPS measures include all relevant laws, decrees, regulations, requirements and procedures. SPS measures can be applied to protect human, animal or plant life or health within the territory of a country from risks arising from plant pests (insects, bacteria, virus), additives, residues (of pesticides or veterinary drugs), contaminants (heavy metals), toxins or disease-causing organisms in foods, beverages or feedstuffs, and diseases carried by animals.[26] Maximum residual limits (MRL) set the standard prescription on active ingredients for the entry of any agricultural product.

Analysis of product-specific maximum residual limits (MRL) as deviated SPS standards has missed detailed scrutiny from the angle of its WTO compatibility. Literature was limited to product-specific losses and the loss

[25] Kallummal and Gurung (2015),Standards Conclave, Published by CII, India.
[26] See http://trade.ec.europa.eu/doclib/docs/2013/april/tradoc_150986.pdf

of market access. There are few analyses on the impacts of the deviations in SPS based MRL standards.

Deviation of Australian SPS standards from the Codex levels and its impact on exports of Philippines pineapple has been analysed by Bathan and Lantican (2009). Philippine's SPS standards for fresh and processed pineapple based on an international standard (Codex standards) and maintained its export competitiveness both in the pre and post-SPS regimes. However, Australia had imposed stringent SPS requirements, which led to a decline in the import volume of Philippine fresh pineapple - as shown by a significant and negative coefficient of SPS dummy variable. In the case of fresh pineapple, Australia's SPS-based standards in comparison to the Philippines national standard (PNS) is more stringent.[27] The argument here is if a country maintains stringent MRL-based standards on active ingredients, imports to that country will suffer. When there are stricter MRLs for plant products in importing country than exporting countries, it will affect trade significantly. Other recent studies by Crivelli and Groeschl (2016) analysed the impact of SPS measures on trade patterns using the database of specific trade concerns of the WTO. The study found that SPS measures constitute obstacles to agricultural and food trade consistently to all exporters (using gravity model). Further, the study revealed the conformity assessment restriction of the SPS measures which hampered market access, the compliance with SPS measures only increased bilateral trade flows.[28]

Felt *et.all* (2002) showed that the standards could decrease the domestic demand for milk or value of imports. The imposition of cheese compositional standards by the Canadian authorities, which imposed minimum limits on the percentage of casein coming from the fluid milk. The study highlighted the need for analysing the processes determining import unit values shortly before or shortly after the beginning of the implementation of the standards.[29]

On the other hand, Niven 2012, the study was unable to infer whether the importer has stricter standards relative to the exporter, and we do not find a robust relationship between these measures and trade. The study indicated

[27] Bathan, Bates M. and Flordeliza A. Lantican, 2009.
[28] Crivelli Pramila and Jasmin Groeschl, 2016.
[29] Felt Marie-Hélène, Bruno Larue and Jean-Philippe Gervais, 2012.

that at least for some import standards, harmonising regulations would increase trade.[30]

The use of SPS measures as trade barriers for imports has increased considerably over the years. SPS-based MRL standards are not only market access challenges for developing countries with lower technological capacity, and this creates serious problems even for developed regions like the European Union (EU) as its exporters faced following challenges:

1. Governments of non-EU countries frequently go beyond what is required to protect the life or health of their consumers and use SPS measures to shield domestic producers of agricultural and fishery products from fair competition.
2. Protectionist policies too often result in fewer choices to consumers and higher prices in shops.
3. Over the years, as tariff barriers were reduced progressively for agricultural and fishery products, such problems are likely to become even more common.[31]

Except for some of these generic statements, most of the studies are product-specific or country-specific, none of these studies addresses the overall regime of stringencies on the existing pattern across developed and developing countries. Therefore, this study is one which attempts to bring forward the nature of SPS based MRL standards across major ten countries, accounting for nearly 40 percent of global trade.

4. MRL Standards on Active Ingredients: SPS-based NTMs

The universe of non-price trade barriers classified into two types: firstly, the non-tariff barriers (NTBs) those that are WTO non-compatible (like quotas) and then secondly, the WTO-compatible NTMs (behind the border) like the SPS-based MRL standards.[32] Again based on the nature of protection, there are at least two ways to analyse whether the MRL standard performs the task of protection that is genuine or is a tool of protectionism (unreasonable).

WTO Member has the right to take SPS measures to protect the life and health of its human population, fauna and flora. Therefore, these MRLs would have to follow the bindings of the SPS Agreements. SPS-based MRL standards have increased across the agricultural sector. These are active

[30] Niven Winchester, *et.all*, 2012.
[31] See http://trade.ec.europa.eu/doclib/docs/2013/april/tradoc_150986.pdf
[32] Dhar Biswajit and Murali Kallummal, 2007.

ingredients (AIs)[33], like pesticides, weedicides fungicides and other agro-chemicals used in the production process of agricultural goods. Some of the provisions of SPS Agreement used to work around genuine protection needed through the application of MRL[34] on active ingredients (AIs) which have led to the creation of ambiguities in the market access for agricultural products.

Therefore, the paper provides detailed profiling and mapping counts and average MRL standards on agricultural products, active ingredients and the calculated stringencies from Codex levels. In the section below, we have analysed the total number of MRLs standards on active ingredients for ten countries. Across the developing and developed countries, the stringency in MRL measures is analysed in detail.

The largest users' of such non-priced barriers are identified with a detailed analysis of the total MRL-based SPS standards across countries is carried out.

1. Absolute numbers of MRL standards in terms of active Ingredients (pesticides, fungicides, herbicides and contaminants) for the 33 agricultural product-levels are analysed;
2. The second level of analysis carried out the deviations measured in absolute numbers of AIs for the selected agricultural products, and the same is expressed as percentages terms also;
3. Third level the analysis carries out across ten countries the average MRL stringencies inactive ingredients for the selected 33 products.

Differential impact of the usage of SPS-based MRL standards on trade is analysed, which brings for the extend of deviation of such non-price measures. However, in this paper the measurement of MRL standards is fundamentally done in two different ways: first by way of calculating the deviations (in terms of numbers); and secondly by calculating the stringencies in terms of numbers or values (measured in times) from the Codex MRL standards on active ingredients. This paper would be profiling the usage of MRL standards on active ingredients by way of calculating stringency agricultural product-wise and country wise.

[33] For simplicity, the SPS based MRL standards on active ingredient hereafter will be the same as MRL standards.

[34] Any food or feed products consumed by human and animals would have a maximum residual limit (MRL), measured in term of particles per million or billion.

4.1. Aggregated MRLs Standards: Country-level Analysis

In this section, we will analyse the total number of agricultural products[35] with the MRL standards based on the presence of active ingredient for ten developed and developing countries. The expectation under the SPS Agreement with over two decades of market access negotiation is to have harmonised standards with minimal differences between countries. This expectation of harmonisation was only limited to tariff that too partially.

The average for ten countries is 19,520 active ingredients (AIs) for 524 agricultural products.[36] There are duplications[37] in the usage of the same active ingredient across several agricultural products.

Table 3: Agricultural Products and Active Ingredients MRL Standards of 10 Countries

Countries	Total Active Ingredients (No. of MRLs)	Total Number of Agricultural Products	Deviation from Codex (No. of MRL standards on AIs)	Deviation from Codex (No. of Ag. Products)	Average MRL standard per product (%)
1	**2**	**3**	**4**	**5**	**6 = 3/2**
Brazil	11,370	470	719	6	24
Canada	15,361	536	4,710	72	29
EU	32,408	534	21,757	70	61
USA	33,304	616	22,653	152	54
Chile	12,342	473	1,691	9	26
India	11,068	474	417	10	23
Malaysia	10,530	474	-121	10	22
Mexico*	33,304	616	22,653	152	54
Japan	22,152	454	11,501	-10	49
Australia	13,365	597	2,714	133	22
Average	**19,520**	**524**			
(International Standard)					
Codex	**10,651**	**464**		**0**	**23**

Note * = Mexico and the United States seem to be closely associated with each other.
Source: Based on Global MRL Database extracted on 11-08-2015.

Table 3 reveals the extent of country-level differences in terms of the number of MRL standards and the coverage of agricultural products. The simple listing of MRL standards would lead to overestimation of the presence of market access barriers; therefore, viewed as the difference between MRL standards prevalent in the particular country and internationally harmonised standard (Codex). In the Codex number of active ingredients

[35] The total agricultural products may have closely related products. For example cattle meat has MRL standards on active ingredients number of sub products like: 1) Cattle by products; 2) Cattle, fat; 3) Cattle, kidney; 4) Cattle, liver and Cattle, meat.

[36] The reason for such large number is the multiple usage of active ingredients across the agricultural products, i.e., the same agro-chemical having MRL standards across agricultural products.

[37] The most common active ingredient '*Chlorantraniliprole*' has 4,597 MRL standards and across nearly all agricultural products in Australia with 533 agricultural products similarly in Brazil (320), Canada (359), Chile (325), European Union (552), India (310), Japan (418), Malaysia (310), and lastly Mexico and United States with 577 agricultural products.

(AIs) is 10,651 with 464 agricultural products. At the national level, the stringent measures (the deviation from the Codex standards) is measured and accounted both in terms of the number of MRL standards and in Index agricultural commodities.

In the category of developed countries, the highest recorded values of AIs with MRL standards were of the United States and Mexico[38] at 33,304 AIs. In the descending order followed by European Union at 32,408 AIs with MRL standards, further Japan and Canada with 22,152 and 15,361 AIs respectively. In terms of agricultural products also, the United States and Mexico leads with 616 agricultural products[39] and closely behind is Australia with 597 products and at the third rank is Canada with 536 agricultural products. In terms of products coverage, Australia and Canada are seen to be ahead of the European Union and Japan considered being highly protected markets followed by the United States. The MRL standards on AIs (Codex standards) is 10,651 for 464 agricultural products; however, the QUAD countries have far higher MRL standards and the number of agricultural products.

In terms of deviations from the Codex standards, the counts of both active ingredients (AIs) and agricultural products of the QUAD countries continue to dominate. In the case of deviations in MRL standard on AIs, the United States has the highest deviation with 22,653 MRL standards over and above the Codex, followed by other Quad countries like EU (21,737), Japan (11,501) and Canada with 4,710 deviations over and above the Codex.

The deviation in agricultural products from the Codex coverage of 464 agricultural products, the developed (83 agricultural products) to developing countries (10 agricultural products) are at the ratio of 10:1, with an advantage for developed countries in terms of higher numbers of agricultural products with MRL standards. Specifically, with respect to Quad countries, the pattern observed in the deviation of AIs is not seen in the case of agricultural products. Australia is in second place after the US with a deviation of 133 agricultural products over and above the Codex coverage of 464 products.

[38] Mexico's MRL standards are identical with the US this could be due to deeper integration under the North American Free Trade Agreement (NAFTA).

[39] In this paper for the analysis uses Index products and not the published products for reason being the published commodities varies from country to country.

Further, with 616 Agricultural products both the United States and Mexico topped the list of 10 countries, see column 3, Table 3. Australia followed closely with 597 agricultural products, and Canada was the third in the list with 536 products. European Union with 534 products was the fourth in terms of ranking. Malaysia and India[40] (474), Chile (473), Brazil (470) and Japan had the least with 454 products.

In terms of national products[41] coverage, the United States topped with 152 additional products over and above the codex list of products, followed by Australia with 133 additional products and at the third place was Canada with 72 additional products. Nearly all countries had a higher number of agricultural product coverage. Japan was the only country with ten products less than the Codex products with MRLs on active ingredients (see Annexure 1).

4.2. Country-wise MRL Standards for Selected Agricultural Products

The sub-section of the paper analyses the variations across ten countries in terms of the total number of agricultural products. Based on risk assessment preformed for known chemicals used as pesticides, the section profiles the number of MRL standards on pesticides, fungicides and herbicides. Table 4 provides an understanding on two aspects: 1) the extent of deviation from international standards (Codex); 2) leading countries in terms of those number of MRL standards for agricultural exports from India.

Shreds of evidence from the previous section suggested that the ten countries deviated in terms of usage of MRL standards on AIs in absolute terms. One of the primary tasks, therefore, would be to analyse the distance from the codex MRL standards on AIs for the selected 33 agricultural products (Table 5). The sub-section addresses three types of deviations found in MRL on active ingredients: total number of MRL standards on AIs under the selected products; average per products MRL standards; and lastly the distance calculated from Codex MRL standards. These deviations help us in understanding the top MRL standards user in terms of products and countries.

Table 4: MRL Standards on AIs in Selected 33 Agricultural Products

[40] India's additional coverage was on agricultural products like Acerola Cherry, Bean-pinto, Cabbage (Chinese, mustard, gai choy), Cassia buds, Fig, Grains of paradise, Guava, Jaboticaba, Plum, American and Plum, Canada.

[41] National coverage is the difference from Codex (international) total list of agricultural products.

Countries	MRL Standards on AIs (for 33 Agricultural Products)	Average Per Product	Compared with Codex MRL (times)
1	*2*	*3*	*4*
Mexico*	2590	79	2.50
Chile	1278	39	1.23
Brazil	1213	37	1.17
India	1092	33	1.04
Malaysia	1067	32	1.01
Average of 4 Developing Countries	***1163***	***35***	***1.11***
Deviation from Codex	***120***	***3***	***0.11***
European Union	3281	99	3.13
United States	2590	79	2.50
Japan	2258	68	2.15
Australia	1365	41	1.30
Canada	1229	37	1.17
Average of 5 Developed Countries	***2145***	***65***	***2.05***
Deviation from Codex	***1102***	***33***	***1.05***
Developed to Developing Ratio	***9***	***10***	***9***
Codex	**1043**	**32**	**1.00**

Note: It indicates Mexico integration with the US as per the Global MRLs database, so it uses a higher reference than the Codex. Harmonisation of the SPS- based MRLs measures is most pronounced in NAFTA (EU being the leading player) with such measures in both the United States and Mexico is fully synchronised. Therefore we have excluded Mexico from the calculations under the developing countries.
Source: Based on Global MRL Database extracted on 11-08-2015.

The international standard of MRL on active ingredients is 1,043 with an average value of 32 for 33 products. All of the ten countries have a higher absolute number of MRL standards and therefore, high average MRL per-agricultural products.

The European Union is the leading applier with total 3,281 MRL standards on AIs, with an average of 99 MRL standards per agricultural products (Table 4). The United States with 2,590 MRL standards and at third position is Japan with 2,238 MRL standards on active ingredients. Australia is ranked at fifth place and has 1,365 MRL standards followed closely by Chile and Canada with 1,278 and 1,229 MRL standards on active ingredients and with 41, 39 and 37 average per agricultural products respectively.

Table 5: Agricultural Products and Number of MRL Standards on Active Ingredients

Agricultural Products #	Codex	Brazil	Canada	EU	USA	Chile	India	Malaysia	Mexico	Japan	Australia
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Barley, grain	38	43	58	78	88	38	41	38	88	73	68
Beet, sugar, root	32	31	35	69	79	46	35	32	79	65	25
Cardamom	1	1	2	11	11	1	1	1	11	10	3
Cattle, meat	85	83	79	129	160	93	84	86	160	137	119
Chickpea	34	32	46	318	181	35	45	41	181	194	76
Coconut	6	6	3	15	19	6	5	6	19	22	9
Coffee bean, green	4	15	5	19	19	4	4	6	19	13	6
Corn, grain	53	85	86	113	143	53	55	54	143	112	79
Cucumber	72	67	72	202	110	84	69	67	110	94	58
Cumin, seed	1	1	3	13	15	1	1	1	15	12	3
Eggs, chicken	49	49	39	77	91	56	49	49	91	74	59
Garlic, bulb	18	27	34	76	84	47	21	16	84	58	36
Grape, table	72	79	79	111	123	85	74	69	123	108	97
Guar	10	10	28	141	54	10	14	14	54	89	29
Lentil	33	31	43	148	96	52	40	38	96	75	63
Mango	13	18	17	38	40	31	14	14	40	35	23
Milk	112	107	89	660	179	103	106	107	179	138	134
Mustard seed (oilseed)	6	6	25	31	37	6	6	6	37	29	9
Nut, cashew	39	38	37	77	88	39	36	37	88	68	27
Nut, walnut, English (Persian)	48	45	45	94	108	66	45	46	108	87	35
Onion, bulb	41	55	54	75	82	52	41	41	82	68	40
Peanut	36	46	34	87	98	36	38	40	98	85	40
Pepper (spice)	1	1	4	11	13	1	1	1	13	10	2
Pepper, non-bell	57	52	69	107	123	141	57	62	123	193	51
Rice	37	54	24	58	74	42	43	45	74	59	47
Saffron	1	1	3	13	15	1	1	1	15	22	2
Sesame, seed	4	4	15	28	33	4	4	4	33	13	10
Soybean	50	99	74	218	128	50	61	52	128	109	60
Spearmint	9	8	13	51	53	9	8	8	53	0	17
Sugar cane	13	35	6	41	49	13	14	16	49	40	25
Tea, leaves	4	4	1	10	12	4	5	5	12	11	5
Turmeric, root	10	9	34	62	69	10	10	10	69	57	21
Wheat, grain	54	71	73	100	116	59	64	54	116	98	87
Country Level Count of AI's	**1043**	**1213**	**1229**	**3281**	**2590**	**1278**	**1092**	**1067**	**2590**	**2258**	**1365**

Note: # = Number of MRL standards on pesticides, fungicides and contaminants.
Source: Based on Global MRL Database extracted on 11-08-2015.

In terms of comparison with Codex, the average per agricultural products of the developed countries at 65 was 2.05 times higher than the international standard of 32 per agricultural products of Codex. The average of the developing countries was at 35 per agricultural product which was 1.1 times higher than the Codex value. Among the developed countries European Union is leading the pack with a score of 3.13 times followed closely by the United States with 2.5 times score and Japan with 2.2 times. Australia with 1.3 times and Canada with 1.2 times ranked the lowest among the developed countries.

The trends observed for five developing countries (Mexico, China, Chile, Malaysia and India) in terms of all the three types of deviations analysed indicates them to be lower in comparison to the developed countries. The average of four developing countries is 1,163 with a deviation of 120 AI MRL standards. Further, when compared with table 3, the number of total agricultural products, we observed that there were 473 products in developing countries with nine additional products over-and-above the Codex products list of 464. Therefore, the *average active ingredients MRL standards per product* recorded a low of 35, and this was two points lower than the Canadian average at 37. Countries with higher averages of the active ingredients MRL standards per products were Chile (39) and Brazil (37).

The average *deviation in the number of MRL standards on active ingredients observed* for the developing countries as a group was 1.15 times over and above the Codex measure of one. The average deviation is only 0.15 time; on the other hand, the developed countries have an average of 1.1 times. Clearly, in terms of the number of active ingredients, the developed countries had nearly doubled the number of active ingredients/substances with MRL standards over the developing countries numbers. Therefore, the developed countries were trade-restrictive by having more active ingredient MRL-based SPS measures/standards.

It is also evident from the analyses of the number of additional agricultural products at the national levels over-and-above the Codex list of agricultural products. Developed countries have an average of 85 additional products and are nine times over developing countries in terms of additional agricultural products. The next section takes a product-wise slightly narrower approach for gauging the market access for India's exports of

agricultural products. Based on Table 5, countries stand out with top MRL based standards are the United States, European Union and Japan.

4.2.1. Products-wise Deviation from International Standards

The presence of MRL standards analysed in four sub-sections, and the first three sub-sections will bring out the extent of deviation from the international standard (Codex) while the fourth will provide the possible impact of such deviated SPS-MRLs on India's exports of 33 agricultural products.

Table 6 assigns the number of MRL standards for each of the agricultural product in the case of the three broad categories (based on the Codex) for the developed and developing groups. This sub-section identifies products having the topmost MRL standards in terms of active ingredients across the ten countries selected. It will allow us to understand the preference of products for the country. As a reference point, the international standard in terms of MRL standards on active ingredients by Codex for 33 agricultural products, see column 2 (table 7, in the next subsection).

The United States dominated with the highest MRL standards in 23 of the total of 33 agricultural products. The twenty-three products were cattle, meat (with 160 MRL standards on active ingredients); corn, grain (with 143 MRL standards) followed by grape, table (123); wheat, grain (116); nut, walnut-Persian (108); eggs, chicken (91); barley, grain (88); nut, cashew (88); garlic, bulb (84); onion, bulb (82); beet, sugar, root (79); rice (74); turmeric, root (69); spearmint (53); sugar cane (49); mango (40); mustard seed for oilseed (37); sesame seed (33); coffee bean, green (19); cumin, seed (15); saffron (15); tea, leaves (12) and cardamom (11). Most of these are products of exports interest for India.

Similarly, in six agricultural products, the European Union is having the highest count of MRL standards on AIs. They are milk (660); chickpea (318); soybean (218); cucumber (202); lentil (148); guar (141) and coffee bean, green with 19 MRL standards (table 5, column 5). At the third spot is Japan with the topmost number of MRL standards count in two agricultural products like pepper, non-bell (193) and cumin, seed (22).

The analysis of the top agricultural products of India's export interest across the ten countries suggests that only three of the Quad countries dominated

in terms of market access restriction based on MRL standards on active ingredients.

4.2.2. Product-Wise Rank Analysis of MRL Standards

The second level of analysis is the ranks difference in both groups (developed and developing) concerning the presence of MRL standards per agricultural products. As a first step, the top twelve agricultural products list common to the developed, and developing countries selected by based on the number of MRL standards taken separately for developed and developing countries and clubbed together.

Table 6: Ranking of Top Ten Products based on Number of Pesticide MRLs

Agricultural Products	Rank of Top AIs Counts for Codex	Rank of Developed Countries	Rank of Developing countries
1	*2*	*3*	*4*
Milk	1	1	1
Cattle, meat	2	3	2
Grape, table	3	5	3
Cucumber	4	8	5
Pepper, non-bell	5	7	5
Wheat, grain	6	7	6
Corn, grain	7	4	6
Soybean	8	5	7
Eggs, chicken	9	13	9
Nut, walnut(Persian)	10	12	9
Chickpea	16	3	14
Lentil	17	10	14

Source: Based on Global MRL Database extracted on 11-08-2015.

In table 6, the unique list of 12 products ranked as per their respective Codex ranking (column 2). The listing of ranks of developed and developing countries listing is done in columns three and four as per the ranks for the 33 products. The analysis finds that the ranks of the Codex and developing countries are almost identical except chickpea and lentil, wherein the difference in the ranking was more than two ranks. On the other hand, the developed country ranks were dissimilar, and only one rank similar and that agricultural product is milk. Agricultural products in which more than two ranks differed the ranks were grape, cucumber, pepper, corn, soybean, eggs, nut-walnut, chickpea and lentil.

The paper observed a strong similarity in the association of the top ranks of Codex and developing countries. Therefore, it suggests two scenarios, either the developing countries are adopting the international regime, or there is an observable similarity between the national standards regime and the

Codex. On the other hand, the dissimilarities between the Codex and developed countries suggested that the countries have not harmonised. It further confirms our argument that developed countries followed a regime of SPS-based MRL standards for food safety, which is not harmonised with the Codex (International) standard.

4.2.3. Deviations in the Usages of MRL-Standards across Developed vs Developing Countries

The third level of analysis is on the existence of deviation differences in the count of average MRL standard deviation from the Codex for developed and developing countries as groups. In this paper, we analysed product level differences from the international standard (Codex), individually for each of the group separately. The last column of Table 7, is representative of the intergroup differences calculated as ratios across 33 agricultural products.

For both the developed and developing countries based on the protection levels, an indication of priority[42] commodities, from the analysis of deviation from Codex. The literature and empirical shreds of evidence, we can list three main reasons. The first reason is on the nature of the agricultural product and the stage of its consumption (raw; smoked/semi-cooked; fully cooked) for animals and human beings. The second reason is the availability of the agricultural products and the dependence of the importing country. The last reason is associated with food processing of the agricultural products. What the country is importing, whether raw or intermediate materials used in processed products. While other non-commercial reasons like rural development, environment, forestry and water management also cannot be ruled out. To understand the dynamics of market access, we have aggregated ten countries into two groups, first being the developed countries (QUAD plus Australia) and the second being the developing countries (Brazil, Chile, India and Malaysia).[43]

The results suggest that in terms of the average number of MRL standards, the top ten agricultural products for developed countries were milk (240) followed by chickpea (163), cattle, meat (124), soybean (117), pepper, non-bell (108), cucumber (107),), corn, grain (106), grape, table (103, wheat, grain (94) and lentil with 85 pesticides. While in the case of developing

[42] Both offensive and defensive list at the country level.

[43] Mexico is not considered as it will certainly distort the selection based on MRL standards on active ingredients as is identical to that of the levels existing in the US and therefore in the developing country group it may lead to biased results, see table 3.

countries, the top ten agricultural products with high MRL standards were milk (105), cattle, meat (86), pepper, non-bell (78), grape, table (76), cucumber (71), soybean (65), wheat, grain (62), corn, grain (61), and both nut, walnut, (Persian) and eggs chicken (50).

Table 7: Developed *Vs* Developing Countries Deviation from CODEX

Agricultural Products	Codex	AIs Additional MRL over and above Codex (Deviation)		
		Developed Countries (#)	Developing Countries (@)	The ratio of Developed by Developing*
(1)	*(2)*	*(3)*	*(4)*	*5 =(3/4)*
Saffron	1	10	0	10.0*
Cumin, seed	1	8	0	8.0*
Pepper (spice)	1	7	0	7.0*
Cardamom	1	6	0	6.0*
Guar	10	58	2	5.7
Turmeric, root	10	39	-1	5.4
Chickpea	34	129	4	4.3
Sesame, seed	4	16	0	4.0*
Spearmint	9	18	-1	3.4
Mustard seed (oilseed)	6	20	0	3.3*
Coconut	6	8	-1	2.8
Milk	112	128	-7	2.3
Garlic, bulb	18	40	9	2.1
Lentil	33	52	7	2.1
Barley, grain	38	35	2	1.8
Soybean	50	68	15	1.8
Corn, grain	53	54	8	1.8
Peanut	36	33	4	1.7
Coffee bean, green	4	8	3	1.7
Sugar cane	13	19	6	1.7
Nut, cashew	39	20	-2	1.6
Mango	13	17	6	1.6
Wheat, grain	54	41	8	1.5
Beet, sugar, root	32	23	4	1.5
Cucumber	72	35	-1	1.5
Nut, walnut, English (Persian)	48	26	2	1.5
Pepper, non-bell	57	57	21	1.5
Cattle, meat	85	40	1	1.5
Grape, table	72	32	4	1.4
Onion, bulb	41	23	6	1.4
Eggs, chicken	49	19	1	1.4
Rice	37	15	9	1.1
Tea, leaves	4	4	0	1.0*
Average number	**1043**	**1108**	**119**	**9.3**

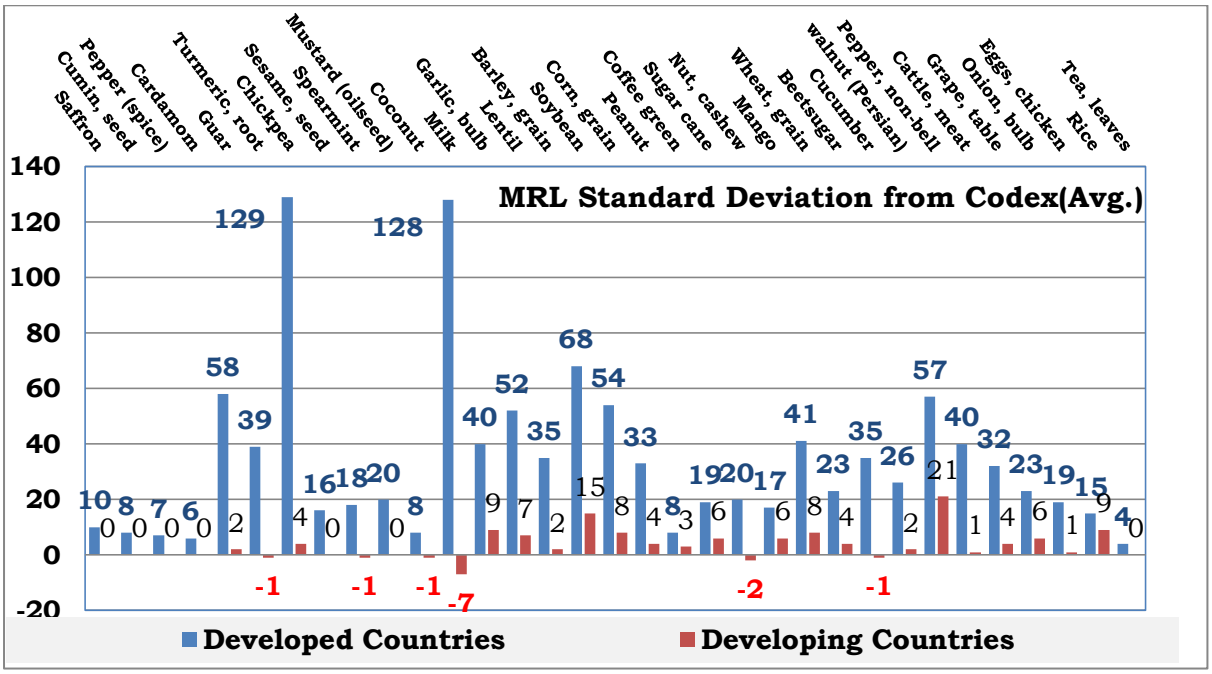
Note #= average count of AIs of five developed countries, @ = similarly the average of four developing countries (excludes Mexico) * = the ratio is estimated simply by dividing the deviation of the developed and developing countries from Codex, in cases where values are zero for developing countries (the denominator replaced with Codex values).
Source: Based on Global MRL Database extracted on 11-08-2015.

In terms of the number of pesticides analysed, milk was having the highest MRL standards for AIs across six countries from the developed and developing categories like European Union (660), Canada (89), Australia &

Brazil both at (107), India (06) and Malaysia (107). It suggested that even among the developing countries, there are wide differences based on the nature of integration with the global economy. Therefore, it suggested that there is a wide difference between developed and developing countries in terms of the application of MRL based SPS measures.

However, broadly we can observe that there is a considerable difference in the average score of the MRL based standards between the groups. In eighteen agricultural products, the ratio of deviation from Codex (developed to developing countries) is above two times[44] like Saffron (10), Cumin-seed (8), Pepper-spice (7), Cardamom (6), Guar (5.7), Turmeric- root (5.4), Chickpea (4.3), Sesame-seed (4), Spearmint (3.4), Mustard - oilseed (3.3), Coconut (2.8), milk (2.3), Garlic-bulb (2.1), Lentil (2.1), Tea-leaves (2), Barley-grain (1.8) Soybean (1.8) and Corn-grain (1.8). Top ranking countries in each of the products categories have made a significant contribution.

Figure 5: Deviation from Codex MRL on AIs: Developed Vs Developing



Source: Authors Calculation based on Global MRL Database extracted on 11-08-2015.

Figure 5 further suggests the high degree of imbalance between the groups in terms of average MRL standards. The developed countries (in blue bars) are having higher MRL standards on active ingredients in almost all the 33 agricultural products compared to developing countries (red bars).

[44] We have taken agricultural products with ratio of 1.8 as equivalent to 2 and have included for the analysis.

4.2.4. Impact of MRL Standards on India's Market Access

The sub-section addresses the actual number of deviations in terms of MRL standards of 33 agricultural products for India and the rest of the countries. The whole analysis is divided into two major divisions the first being stringencies, which are an outcome of deviations. However, the second issue, which is of greater importance is the issue of 'non-codex MRL standard'[45] as notified by developed and developing countries. The central question of this paper is why there has been a decrease in market access for India's agricultural exports in general and particularly to developed countries. Partly the answer lies in the increased use of SPS-based MRL standards. All these have affected India's agricultural exports and raised many issues in the context of market access negotiations, especially the WTO compatibility of such MRL standards.

The first issue is being addressed in Table 8. We observe that the average number of MRL standards in 9 markets are significantly higher than the Indian number of MRL standards in all of the 33 agricultural products taken up for analysis. Most extreme cases are observed in Index agricultural products like milk (with 85 additional MRL standards over and above Indian MRL standards) it is followed by 21 other agricultural commodities like chickpea (61), pepper- non-bell (39), soybean (34), guar (32), corn-grain (28), lentil (24), cucumber (23), garlic-bulb (21), cattle-meat (20), turmeric-root (19), barley-grain (16), grape-table (16), walnut (15), peanut (15), onion-bulb (14), wheat-grain (13), mango (11), sugar cane (11), mustard-oilseed(10), nut-cashew (10) and spearmint at 10 MRL standards (see table 8). The lowest level of deviation is in MRL standards of Tea leaves with only one deviation. Therefore, table 8 established beyond doubts that India faced with deviation from Indian MRL standards in nearly all 33 agricultural products it exported.

It is now well established that a majority of the developed countries had much higher MRL standards on AIs for agricultural products. The finding suggests that 578 MRL standards across nine markets were higher than Indian MRL standard. It indicates that India faced many MRL standards on its products across the nine countries. There is a certainty that the developed countries create most of these SPS based MRL standards which acted as barriers to India's exports.

[45] These are MRL Standard on agricultural products for which the Codex has not identified a MRL standard.

Table 8: India's Market Access and the Number of Active Ingredients

Agricultural Products #	Active Ingredients (Number)			
	Codex MRL Standards	Average MRL standards in 9 Markets	India's MRL Standards	Higher than India
(1)	*(2)*	*(3)*	*(4)*	*(5=(3-4)*
Milk	112	191	106	85
Chickpea	34	106	45	61
Pepper, non-bell	57	96	57	39
Soybean	50	95	61	34
Guar	10	46	14	32
Corn, grain	53	83	55	28
Lentil	33	64	40	24
Cucumber	72	92	69	23
Garlic, bulb	18	42	21	21
Cattle, meat	85	104	84	20
Turmeric, root	10	29	10	19
Barley, grain	38	57	41	16
Grape, table	72	90	74	16
Nut, walnut, English (Persian)	48	60	45	15
Peanut	36	53	38	15
Onion, bulb	41	55	41	14
Wheat, grain	54	77	64	13
Mango	13	25	14	11
Sugar cane	13	25	14	11
Mustard seed (oilseed)	6	16	6	10
Nut, cashew	39	46	36	10
Spearmint	9	18	8	10
Eggs, chicken	49	58	49	9
Beet, sugar, root	32	43	35	8
Sesame, seed	4	11	4	7
Coffee bean, green	4	10	4	6
Coconut	6	10	5	5
Saffron	1	6	1	5
Cumin, seed	1	5	1	4
Rice	37	47	43	4
Cardamom	1	4	1	3
Pepper (spice)	1	4	1	3
Tea, leaves	4	6	5	1
Country Level Count of MRLs	**1043**	**1670**	**1092**	**578**

Source: Based on Global MRL Database extracted on 11-08-2015.

Table 9 provides the summary results of 33 agricultural products based on the count of MRL standards under three broad categories, MRL standards which are equal to Codex; higher than Codex and lower than Codex MRL standards. The results show that developed countries had a higher number of products with much higher restrictions on pesticides residuals. In countries like the EU and the USA, all 33 agricultural products belonged to higher than the Codex category, followed by Japan with 32 and Australia with 28 products.

Canada has 22 Index agricultural products in this category of higher than Codex. The same in the case of India can be explained as defensive

strategies as some of these products could be having higher global linkages production chains, thus were having higher MRL standards.

Table 9: Summary Table: Average Deviations from Codex Alimentarius

Count of MRL Standards on 33 Products for 10 Countries	Canada	EU	USA	Japan	Australia	Brazil	Chile	India	Malaysia
Equal Codex	1	--	--	--	--	10	18	11	13
More than Codex	22	33	33	32	28	12	14	15	13
Less than Codex	10	--	--	1	5	11	1	7	7
Agricultural Products	**33**	**33**	**33**	**33**	**33**	**33**	**33**	**33**	**33**

Source: Based on Global MRL Database extracted on 11-08-2015.

Section III

The differential SPS standards stringencies are analysed in this section. The analysis performed in terms of averages of MRL standards on active ingredients for 33 agricultural products across ten countries. Each country is analysed separately to bring out country-specific issues concerning trade with India.

5. Stringent MRL Standards across Ten Countries[46]

SPS based MRL standards on 33 agricultural products Codex MRL standards analysed across ten tables of this sub-section all tables follow a similar structure. The first column each of table indicates the agricultural products the second column the International (Codex) MRL standards for each of the products. The third column shows the total number of MRL standards for each country. The MRL standard that is equal or less stringent than Codex standards (Column 4). The last column represents the measure of MRL stringency, measured over and above the Codex MRL standard level – represented in terms of the number of times.

The sub-section deals with three aspects of stringency in 33 agricultural products, and the methodology used is simple and straight forward. The stringencies across 33 agricultural products in terms of identification of MRL standards using the difference between the MRL standards on active

[46] Cattle meat is an example of one of the 33 agricultural products in case of India. The sub-section will analyse only the core product and does not cover all the by products like cattle-fat, cattle-kidney and cattle-liver. The total number of Codex MRL standards has decreased from 1043 to 989 in this section. Similar changes can be observed in national MRL standards across 10 countries.

ingredients at the national[47] and that of Codex MRL standards. These then are tabulated in columns 4 and 5 as counts of active ingredients with MRL equal to or less Stringent than Codex and those with more stringent MRL than Codex.

Further, the MRL stringency on active ingredients analysed for ten countries, including India. Tables 10 to 18, provides country-by-country analysis on stringencies across 33 agricultural products - focusing on stringency in terms of the number of times. We will not be attempting to find the WTO compatibility in this paper, as the core objective is to list such measures, thereby highlight, and lay the foundation for further work in this area across countries.

Some of the non-tariff measures related aspects revealed in this report are the country-wise information on MRL standards; how these differ from international (Codex) standards. One other important aspect which the analysis will introduce is the existence of unevenness (non-harmonised) of the usage of non-Codex MRL standards across countries. National governments publish a significant share of these documents through a series of legislative changes mainly after the WTO negotiations which began in 1995. Therefore, such issues miss the negotiator vision as they are unable to contextualise the market access impact on imports, as they are often without trade links. In recent decades, there is a stark departure from the principles of liberalisation and harmonisation across the developed world, and such moves have been more pronounced.

5.1. European MRL Standards Regime on Active Ingredients

In 2016 European Commission[48] (EC) is ranked as the topmost destination for India's agricultural and allied sector exports. India exports close to US$ 3,712 million of agricultural and allied sector products to the EC. Many of these agricultural and allied products have been subjected to import refusal by the EC. Two studies that have attempted to quantify these impacts of the refusals on India authored by Kallummal, Gupta and Varma (2012)[49] and

[47] At the national level countries are free to apply different MRL standards on ingredients/substances under the SPS Agreement under Article 5 exceptions.

[48] EC import data for 2016 does not have data for member like Austria, Finland, Netherlands and Slovakia.

[49] Kallummal Murali, Aditi Gupta and Poornima Varma, 2012, *'Agricultural Trade from South-Asia and the Impact of SPS Measures: A Case Study European Rapid Alert System for Food and Feed (RASFF)'*, Journal of Economic Policy and Research vol. 8 (2), pp. 40-75, ISSN 0975-8577.

Disha, Kallummal and De Roy (2017).[50] Both the studies have found a high correlation of EC's refusal and imports and the same coordinated through the RASFF.[51] Both studies found that the refusals harmed India's exports, especially those made by small exporters who were statistically significant.

The protectionism in terms of usage of SPS-based MRL standards has seen an increase since 2008, and falling India's agricultural exports shares to EU - for refusing imports from India since 2008.[52] The European Parliament and the Council adopted Regulation (EC) No 178/2002 laying down the general principles and requirements of food law. The General Food Law Regulation is the foundation of food and feed law. It sets outs an overarching and coherent framework for the development of food and feeds legislation both at Union and national levels. To this end, it lays down general principles, requirements and procedures that underpin decision making in matters of food and feed safety, covering all stages of food and feed production and distribution. It also sets up an independent agency responsible for scientific advice and support, the European Food Safety Authority (EFSA). The EFSA is the sole agency which is responsible for maintaining, and verification of all the risk assessments carried out. Further, it also led to the creation of the procedures and tools for the management of emergencies and crisis (largely based on precautionary principles) called the Rapid Alert System for Food and Feed (RASFF). The RASFF is the agency that permitted and refused food and feed products the market access basing it on the various food safety regulations of the EC.

In the case of EC (Table 10) it was observed that the selected 33 agricultural products have an overall measure of MRL stringency of 6.8 times over the internationally prescribed MRL level. European Union also recorded the highest rate of stringency among the ten countries analysed, further suggesting that the ECs markets are one of the most protected by way of SPS-based MRL standards.

Table 10: European Commission MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients	Average Stringency

[50] Jain Disha, Murali Kallummal and Shantanu De Roy, 2017, "Impact of SPS-Based MRL Standards on Agro Food exports from India to EU", TERI Dissertation, mimeo.

[51] See for details, https://ec.europa.eu/food/safety/rasff/portal_en.

[52] EC, 2000, "White Paper on Food Safety", Commission of the European Communities, Brussels, 12 January, COM (1999) 719 final, <http://ec.europa.eu/dgs/health_food-safety/library/pub/pub06_en.pdf>

	Codex Standards	EUs'AIs	Equal to or less Stringent than Codex	More Stringent MRL than Codex	
Grape, table	72	111	54	15	38.7
Rice	32	58	24	6	22.6
Pepper, non-bell	57	107	31	21	7.9
Cucumber	64	101	45	16	7.6
Soybean	50	109	34	13	7.0
Chickpea	26	105	16	6	6.9
Wheat, grain	53	100	39	10	4.2
Cattle, meat	85	129	51	26	4.0
Barley, grain	38	78	31	4	3.9
Onion, bulb	41	75	34	5	3.6
Coffee bean, green	4	19	2	2	3.1
Lentil	23	74	16	4	3.0
Sugar cane	13	41	10	2	2.8
Nut, cashew	39	77	31	6	2.7
Nut, walnut, English (Persian)	48	94	39	7	2.7
Guar	10	47	7	2	2.6
Corn, grain	53	113	43	7	1.8
Eggs, chicken	49	77	36	7	1.7
Beet, sugar, root	32	69	27	4	1.3
Peanut	36	87	31	3	1.2
Milk	91	132	73	10	1.1
Sesame, seed	4	28	3	1	1.1
Tea, leaves	4	10	2	1	1.1
Cardamom	1	11	1		1.0
Cumin, seed	1	13	1		1.0
Mustard seed (oilseed)	6	31	5	1	1.0
Pepper (spice)	1	11	1		1.0
Saffron	1	13	1		1.0
Garlic, bulb	18	76	16		0.9
Mango	13	38	12		0.9
Turmeric, root	10	62	10		0.9
Spearmint	8	51	8		0.8
Coconut	6	15	5		0.7
Total	**989**	**2162**	**739**	**179**	**6.8**
Percentage Share (%)	**100**	**219**	**34**	**24**	

Source: Based on Global MRL Database extracted on 21-08-2015

In the EC markets, the MRL standards for 23 products of the total 33 products have a value of more than one times, and this suggested that imports could be allowed only if the products meet this stringent MRL measure. It also suggested that the ECs can technically deny market access citing the reasons of food safety (under the SPS Agreement). Thereby the stringency is being used for denying market access which otherwise assessable under the alone tariff regime or other trade policy disciplines.

The average stringencies in these agricultural products are Grape-table (38.7), Rice (22.6), Pepper-non-bell (7.9), Cucumber (7.6), Soybean (7), Chickpea (6.9), Wheat-grain (4.2), Cattle-meat (4), Barley-grain (3.9), Onion-bulb (3.6), Coffee bean-green (3.1), Lentil (3), Sugar cane (2.8), Nut-cashew (2.7), Nut-walnut-English (Persian) (2.7), Guar (2.6), Corn-grain (1.8), Eggs-chicken (1.7), Beet-sugar-root (1.3), Peanut (1.2), Milk (1.1), Sesame-seed

(1.1) and Tea-leaves (1.1). European Union MRL standards on active ingredients with a 'value of one' as an average stringency qualified only five products, identified to be equal to Codex standards, and this meant agricultural products like Cardamom; Cumin-seed; Mustard-oilseed; Pepper-spice and Saffron.

Another five agricultural products had lower than Codex MRL standards in the EU market. The agricultural products belonging to this third category are Garlic-bulb; Mango; Turmeric-root; Spearmint and Coconut. Suggesting that in total, ten agricultural products had market access under the SPS based MRL standards regime in the European Union.

Besides, the probability of usage of non-Codex active ingredients is high in products like sesame-seed, tea-leaves, cardamom, cumin-seed, mustard-oilseed, pepper-spice, saffron, garlic-bulb, mango, turmeric-root, spearmint and coconut. As European Union has the second-highest number of national MRL standards on active ingredients with highest average stringency across ten countries analysed in this paper, in all 33 agricultural products the EU's Codex MRL standards is larger in number terms than the Codex MRL standard. Twenty-four percent of SPS-based MRL standards for EU falling under the most stringent measure suggested a high level of protection of the EU markets.

5.2. US and Mexican MRL Standards on Active Ingredients

The United States and Mexico's results of the MRL standards on active ingredients have been analysed in one table, as there is a complete similarity in terms of the MRL standards in 33 agricultural products. Another trend, which reveals itself from the similarity of MRL standards, is the extent of trade links between countries and their influences on the regulatory harmonisation. Mexico follows most of the United States when it comes to fixation of the MRL standards on active ingredients. Although the countries are way apart on any measure of comparison of economic factors and concerns.

In 2016, the United States (US) was ranked as the second destination after the EU in terms of agricultural and allied sector exports from India. India exports close to US$ 3,692 million worth of agricultural and allied sector products which accounts for nearly 25 percent of India's global exports.

There is some evidence of refusal of the case of agricultural and allied products by the US. [53],[54]

In the US food and feed products are regulated and monitored for contaminants and establish standards for feed contaminants, approves safe food additives, medicated feed and pet food programs managed by the Food and Drug Administration's (FDA). In the US, the imported products have a value of US$109 billion and have been increasing in amount and variety, and it accounts for 15 percent of the US food supply.[55] Studies on Indian exports, based on Operational and Administrative System for Import Support (OASIS) suggests that the US refusals were almost similar with additional products like spices, whole grains, snack food, bakery products, food sweeteners, nuts, beverages and soft drinks, milk candy and cheese.

However, in the analysis of selected 33 agricultural products, it was observed that the MRL standards had an overall average measure at 2.8 times stringency. Suggesting that the United States had MRL stringency of nearly three times over the MRL standards prescribed by Codex Alimentarius. In terms of average MRL standards on active ingredients, the United States is the fourth rank with EU, Australia and Brazil having higher MRL Standards in the selected agricultural products. In the United States, a substantial number of agricultural products (24) had MRL standards more than one times; this suggested that imports could be allowed only if these products meet the stringent MRL measures. It also suggested that it can deny market access citing the reasons of food safety (under the SPS Agreement).

Table 11: United States MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average of Stringency
	Codex Standards	United States AIs	Equal to or less Stringent than Codex	More Stringent MRL than Codex	
Rice	32	69	22	10	11.8

[53] Kallummal Murali and Gurung Hari Maya, 2015, "***The United States SPS Measures on Agricultural Products Imports on BRIICS Countries"***, edited book by Sharma S.K, Kallummal M. and Roy, Agricultural and Trade: Emerging Issues and Challenges in India.

[54] Kallummal Murali, Aditi Gupta and Varma Poornima, 2013, "Exports of Agricultural Products from South-Asia and Impact of SPS Measures: A Case Study of European Rapid Alert System for Food and Feed (RASFF", Journal of Economic Policy and Research, v.8(2).

[55] European Parliament, 2015, ***"Food Safety Policy and Regulation in the United States",*** Study for the ENVI Committee, Directorate General of Internal Policies, Policy Department, Economic and Scientific Policy, http://www.europarl.europa.eu/RegData/etudes/STUD/2015/536324/IPOL_STU(2015)536324_EN.pdf

Barley, grain	38	88	23	15	8.2
Guar	10	54	2	8	5.9
Cattle, meat	85	160	41	44	5.1
Cumin, seed	1	15		1	4.0
Wheat, grain	53	116	33	20	3.5
Eggs, chicken	49	91	40	9	3.3
Turmeric, root	10	69	4	6	3.2
Pepper, non-bell	57	120	43	14	3.0
Grape, table	72	123	51	21	2.4
Soybean	50	128	32	18	2.2
Chickpea	26	117	16	9	1.9
Cucumber	64	110	50	14	1.9
Corn, grain	53	140	45	8	1.7
Peanut	36	98	25	11	1.6
Beet, sugar, root	32	76	22	10	1.5
Coconut	6	19	4	2	1.5
Garlic, bulb	18	84	13	5	1.5
Lentil	23	83	15	8	1.5
Nut, walnut, English (Persian)	48	108	41	7	1.4
Spearmint	8	53	2	6	1.4
Sugar cane	13	49	11	2	1.3
Milk	91	160	70	16	1.2
Nut, cashew	39	88	33	6	1.1
Cardamom	1	11	1		1.0
Onion, bulb	41	82	34	7	1.0
Pepper (spice)	1	13	1		1.0
Saffron	1	15	1		1.0
Coffee bean, green	4	19	2	2	0.9
Mustard seed (oilseed)	6	37	5	1	0.9
Tea, leaves	4	11	4		0.7
Sesame, seed	4	33	4		0.6
Mango	13	40	13		0.4
Total	**989**	**2479**	**703**	**280**	**2.8**
Percentage Share (%)	**100**	**251**	**28**	**40**	

Source: Based on Global MRL Database extracted on 21-08-2015

For regulating and denying market access, which would qualify to be a trade policy measure, stringent MRL standards are used. The products belonging to this list are Rice (11.8), Barley-grain (8.2), Guar (5.9), Cattle-meat (5.1), Cumin-seed (4), Wheat-grain (3.5), Eggs-chicken (3.3), Turmeric-root (3.2), Pepper-non-bell (3), Grape-table (2.4), Soybean (2.2), Chickpea (1.9), Cucumber (1.9), Corn-grain (1.7), Peanut (1.6), Beet-sugar-root (1.5), Coconut (1.5), Garlic-bulb (1.5), Lentil (1.5), Nut-Walnut-Persian (1.4), Spearmint (1.4), Sugar cane (1.3), Milk (1.2) and Nut-cashew (1.1).

Four products of the United States MRL standards are equal to codex standards with 'value of one'. The products in the list are Cardamom, Onion-bulb, Pepper-spice and Saffron. Further, additional five products have less than the prescription by Codex for products like Coffee-bean-green, Mustard-oilseed, Tea, Sesame-seed and Mango.

5.3. Malaysian MRL Standards Regime on Active Ingredients

In 2016, Malaysia was ranked as the third top destination after the EU and US in terms of agricultural and allied sector exports from India. India's exports stood close to US$ 899 million under the agricultural and allied sector and accounted for 6 percent of its global share. There is very little evidence of refusal of agricultural and allied products as Malaysia does not maintain a record of refusal of Imports into the country from third parties. The lack of this information denies researchers and policymakers to assess of behind the border refusals.

In 1985, Malaysia notified food and feed regulation[56] the latest revision was on "incidental constituent" in 2014. The Regulations on "incidental constituent" means any foreign, extraneous, toxic, noxious or harmful substances that are contained or present in or on any food. It includes metal contaminant, microorganisms and their toxins, drug residue and pesticide residue but does not include a preservative, colouring substance, flavouring substance, flavour enhancer, antioxidant, food conditioner, non-nutritive sweetening substance or added nutrient or any other substance permitted to be added to food by these Regulations. The regulation also laid rules that no person shall import, prepare or advertise for sale or sell any food containing any incidental constituent, except as otherwise specified in regulations 38, 38A, 39, 40 and 41. Regulation no 38 covered restriction on the metal contaminant, 38A on 3-monochloropropane-1,2-diol (3-MCPD), 39 on microorganisms and their toxins, section 40 on drug residue and 41 on pesticide residues.

In the case of Malaysia (Table 12) it was observed that the selected 33 agricultural products with an average stringency of 1.1 times, it is only marginal (0.1times) higher MRL standards over the Codex Alimentarius. In terms of MRL standards, Malaysia is least among the ten countries, suggesting that it was the least protectionist in the case of 33 agricultural products.

Table 12: Malaysia's MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average of Stringency
	Codex Standards	Malaysia's AIs	Equal to or less Stringent than Codex	More Stringent MRL than Codex	
Tea, leaves	4	5	3	1	2.6

[56] Food Regulations 1985 (gazetted on 26 September 1985) of the Food Act 1983 (enacted as Laws of Malaysia Act 281; gazetted on 10 March 1983). < http://fsq.moh.gov.my/v5/ms/food-regulations-1985-2/>

Cattle, meat	85	86	81	3	1.3
Pepper, non-bell	57	61	46	6	1.3
Rice	32	41	28	4	1.3
Corn, grain	53	54	47	3	1.2
Guar	10	14	8	2	1.1
Barley, grain	38	38	38		1.0
Beet, sugar, root	32	32	32		1.0
Cardamom	1	1	1		1.0
Coconut	6	6	5		1.0
Coffee bean, green	4	6	3		1.0
Cucumber	64	64	57	3	1.0
Cumin, seed	1	1	1		1.0
Eggs, chicken	49	49	49		1.0
Garlic, bulb	18	16	16		1.0
Grape, table	72	69	67	1	1.0
Milk	91	89	87	1	1.0
Mustard seed (oilseed)	6	6	6		1.0
Nut, cashew	39	37	36		1.0
Nut, walnut, English (Persian)	48	46	45		1.0
Onion, bulb	41	41	38	1	1.0
Peanut	36	40	35	1	1.0
Pepper (spice)	1	1	1		1.0
Saffron	1	1	1		1.0
Sesame, seed	4	4	4		1.0
Soybean	50	52	47		1.0
Spearmint	8	7	7		1.0
Turmeric, root	10	10	10		1.0
Wheat, grain	53	53	53		1.0
Chickpea	26	33	24		0.9
Lentil	23	31	22		0.9
Mango	13	14	12		0.9
Sugar cane	13	16	12		0.9
Total	**989**	**1024**	**922**	**26**	**1.1**
Percentage Share (%)	**100**	**104**	**90**	**3**	

Source: Based on Global MRL Database extracted on 21-08-2015.

In Malaysia, only in the case of 6 products with stringent MRL standards with values of more than one. It suggested that Malaysia allowed imports only if these agricultural products meet the stringent MRL standard. Technically, Malaysia denies market access citing the reasons for food safety under the SPS Agreement. Stringency SPS-based MRL measures used for restricting market access, which would qualify the trade policy measure – which needs to be grounded in domestic economies. The agricultural products which could face such measure are tea (2.6), cattle-meat (1.3), pepper-non-bell (1.3), rice (1.3), corn-grain (1.2) and guar (1.1).

A large number of products (23) had MRL standards equal to the Codex standard in Malaysia. These agricultural products are barley, beet-sugar-root, cardamom, coconut, coffee, cucumber, cumin, eggs, garlic-bulb, grapes, milk, mustard-oilseed, cashew, nut-walnut-Persian, onion-bulb, peanut, pepper-spice, saffron, sesame-seed, soybean, spearmint, turmeric-root and wheat-grain.

Further, four products have less than what was prescribed by the Codex, and these products are chickpea, lentil, mango and sugar cane. It suggests that twenty-seven products had market access under the SPS based MRL standards regime in Malaysia. Malaysia is the most liberal market analysed in the context of MRL standards on active ingredients, except for the export of tea.

5.4. Japanese MRL Standards Regime on Active Ingredients

In 2016, Japan ranked as the fifth destination for Indian exports of Agricultural and allied products after the EU, US and Malaysia. India's exports stood close to US$ 746 million under the agricultural and allied sector and accounted for 5 percent of its global exports.

In terms of MRL standards, Japan has specifications on food and feed standards set out in multiple legislations like "Food Sanitation Act" (1947), "Ordinance for Enforcement of the Food Sanitation Act" (1948), "Ministerial Ordinance Concerning Compositional Standards for Milk and Milk Products" (1951), relevant legislation, notices and announcements issued by the Ministry of Health, Labour and Welfare (MHLW), as well as legislations issued by the Consumer Affairs Agency (CAA) regarding food labelling.[57] Japan followed a positive approach to MRL Standards, and it has stated a uniform base limit set at 0.01ppm on all food and feed additives[58] other than the 64 substances.[59] The increased international distribution of food, this importance of the formulation of international rules on transaction of food through trade is increasing. However, the SPS Agreement of the WTO Agreements is the basis for protecting food safety and human, animal and plant health. It required the regulations in the respective countries to harmonise with Codex standards, with an exception for countries with scientific evidence and risk assessment dossiers establishing a higher level of protection. Imposing more strict regulation than what is prescribed by the SPS agreement can be considered as a non-tariff barrier (NTB). The non-tariff barrier is a measure which is not compatible under the disciplines

[57] JETRO, 2011, "Specifications and Standards for Foods, Food Additives, etc., Under the Food Sanitation Act 2010", Japanese External Trade Organisation, April, https://www.jetro.go.jp/ext_images/en/reports/regulations/pdf/foodext2010e.pdf

[58] Food and feed additives include pesticides, agro-chemical, pathogens, and other substances which gets added during the various stages of products from '*plough to fork*'.

[59] Ibid. Table F03, p.38, JETRO, 2011.

of the WTO.[60] However, by 2010, there were efforts in the direction of cooperation between ministries to harmonise standards with international standards to have more of WTO compliant standards - the evidence not seen on the ground. In the case of Japan (Table 13), it was observed that of the 33 selected agricultural products with stringency value of 1.9 times.

Table 13: Japan's MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average of Stringency
	Codex Standards	Japan's Standard	Equal to or less Stringent than Codex	More Stringent MRL than Codex	
Rice	32	52	15	12	13.6
Guar	10	46	4	5	6.0
Cattle, meat	85	137	46	34	5.3
Tea, leaves	4	11	2	2	4.0
Beet, sugar, root	32	65	29	2	3.2
Mango	13	35	10	2	2.6
Chickpea	26	106	20	3	2.0
Milk	91	138	70	15	1.5
Lentil	23	75	18	3	1.4
Wheat, grain	53	98	41	9	1.4
Nut, walnut, (Persian)	48	87	40	4	1.3
Barley, grain	38	73	28	8	1.2
Pepper, non-bell	57	108	44	9	1.1
Soybean	50	109	41	5	1.1
Peanut	36	85	30	5	1.0
Coffee bean, green	4	13	2	1	0.9
Corn, grain	53	112	45	6	0.9
Eggs, chicken	49	74	41	3	0.9
Cardamom	1	10	1		0.8
Coconut	6	13	5	1	0.8
Cumin, seed	1	12	1		0.8
Garlic, bulb	18	58	15		0.8
Nut, cashew	39	68	33	2	0.8
Onion, bulb	41	68	35	3	0.8
Pepper (spice)	1	10	1		0.8
Saffron	1	12	1		0.8
Sesame, seed	4	13	4		0.8
Sugar cane	13	40	11		0.8
Grape, table	72	108	65	3	0.7
Cucumber	64	94	58	2	0.6
Turmeric, root	10	55	10		0.3
Mustard seed (oilseed)	6	29	6		0.2
Spearmint	8	0			0.0
Total	**989**	**2014**	**772**	**139**	1.9
Percentage Share (%)	**100**	**204**	**38**	**18**	

Source: Based on Global MRL Database extracted on 21-08-2015.

Therefore, suggests that Japan had nearly two times higher MRL standards than compared to Codex Alimentarius. Japan is moderately placed in terms

[60] Japan, 2011, "Ensuring drug and food safety", Ministry of Health, Labour and Welfare, http://www.mhlw.go.jp/english/policy/health-medical/food/dl/pharmaceutical_and_food_safety_bureau.pdf

of stringencies as observed in terms of deviation in MRL standards from the Codex, among the ten countries analysed in this paper. In Japan the MRL standards on active ingredients for 14 products of the selected 33 products were found to have a value of more than one times, this suggested that imports could be allowed only if the products meet this stringent MRL measure. Japan can technically deny market access citing the reasons of food safety (under the SPS Agreement).

Thereby the stringency is being used for regulating/restricting market access which would qualify to be a trade policy measure. The products belonging to this list are rice (13.6), guar (6), cattle-meat (5.3), tea-leaves (4), beet-sugar-root (3.2), mango (2.6), chickpea (2), milk (1.5), lentil (1.4), wheat-grain (1.4), nut-walnut-Persian) (1.3), barley-grain (1.2), pepper-non-bell (1.1) and soybean (1.1).

Japan's MRL standard was equal to the codex standards only in one product with 'value of one', and the product is Peanut. Further, eighteen products had lesser MRL standards averages than what was prescribed by Codex and these agricultural products are coffee-bean-green, corn-grain, eggs-chicken, cardamom, coconut, cumin-seed, garlic-bulb, nut-cashew, onion-bulb, pepper-spice, saffron, sesame-seed, sugar-cane, grape-table, cucumber, turmeric-root, mustard-oilseed and spearmint. However, Japan also had 2,014 MRL standards on the active ingredient, which were not listed by the International standard. It suggested that Japan has provided market access in only one product under the SPS based MRL standards regime. Due to the limitation of comparative values at the international level, the paper cannot make a concrete judgement on eighteen products listed above.

5.5. Canadian MRL Standards Regime on Active Ingredients

Ranked at fourteenth rank as a destination for Indian exports of Agricultural and allied products after the EU, US, Malaysia and Japan. India's exports stood close to US$ 390 million under the agricultural and allied sector and accounted for 2.6 percent of its global exports.

Non-Compliance with the Canadian regulation like Health of Animals and Plant Protection Act regulations have been the sole reason for all the five shipments which were refused entry into Canada for the period 2012 to 2016. The five products of Indian consignments were butter, chocolate milk, dairy milk, ghee and raw wheat, all of which were products of Canadian export interest. Food safety concerns on India's imports into

Canada could trigger refusal that in turn, can lead to recalls or destruction of consignments. However, the recorded cases are few in the past five years.[61]

Table 14: Canadian MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average of Stringency
	Codex Standard	Canadian Standard	MRL equal to or less Stringent than Codex	More Stringent MRL than Codex	
Barley, grain	38	58	11	16	13.7
Cattle, meat	85	79	21	25	6.7
Guar	10	28	2	3	5.7
Wheat, grain	53	73	20	11	4.8
Soybean	50	74	22	9	2.3
Turmeric, root	10	34		2	2.3
Corn, grain	53	85	31	8	2.0
Grape, table	72	79	36	19	2.0
Chickpea	26	46	10	3	1.8
Eggs, chicken	49	39	17	4	1.8
Peanut	36	34	17	7	1.8
Beet, sugar, root	32	35	9	7	1.7
Garlic, bulb	18	34	8	3	1.7
Lentil	23	43	10	3	1.6
Spearmint	8	13	2	2	1.5
Milk	91	80	31	15	1.3
Mustard seed (oilseed)	6	24	4	2	1.2
Onion, bulb	41	54	26	9	1.2
Pepper, non-bell	57	69	26	11	1.2
Rice	32	24	10	5	1.1
Coconut	6	3	1		1.0
Cucumber	64	72	35	10	1.0
Mango	13	17	6	1	1.0
Sesame, seed	4	15	3	1	1.0
Sugar cane	13	6	3		1.0
Nut, cashew	39	36	23	3	0.9
Nut, walnut, English (Persian)	48	44	24	5	0.9
Coffee bean, green	4	5	1		0.3
Cardamom	1	2			0.0
Cumin, seed	1	3			0.0
Pepper (spice)	1	2			0.0
Saffron	1	2			0.0
Tea, leaves	4	1			0.0
Total	**989**	**1213**	**409**	**184**	**2.7**
Percentage Share (%)	**100**	**123**	**34**	**45**	

Source: Based on Global MRL Database extracted on 21-08-2015.

Although, the reasons of import refusal of consignments could be manifold some of the prominent one being: first is the illness outbreak; second based on food test result obtained by the Canadian food inspection Agency (CFIA) industry, a provincial or territorial government or another country identify a

[61] Quarterly Reports of Food Shipments Refused Entry into Canada, 2012-13 to 2016-17. http://www.inspection.gc.ca/about-the-cfia/accountability/compliance-and-enforcement/refused-entry/eng/1324305448701/1324305531127.

possible health risk. The third reason is the inspection finding, and visual observation of products having food safety concern. While the fourth reason for refusal is consumer complaint and the fifth is the company-initiated recalls. Finally, the sixth reason is the other triggers like information from law enforcement about potential food tampering, trade complaints, information from consumer associations, or even posts on social media websites. However, the authors found no literature for India on the impact of the import refusal by Canada from 2012 to 2017. It also depends on the enforcement and notification transparencies followed in the Canadian Agricultural market access.

In the case of Canada (Table 14), the average measure of stringency of 2.7 times in 33 agricultural products. It suggests that Canada has nearly three times higher MRL standards to what has been prescribed by Codex Alimentarius. In Canada, the MRL standards on active ingredients for 20 out of the total selected 33 agricultural products is more stringent. Imports could be allowed only if these products are compliant with Canadian regulations, which are more stringent when compared with Codex. Canada can technically deny market access, quoting a reason for 'non-compliance with food safety regulations'. Barley topped with nearly 14 times more stringent MRL standards than Codex followed by cattle-meat (6.7), guar (5.7), wheat-grain (4.8), soybean (2.3), turmeric-root (2.3), corn-grain (2), grape-table (2), chickpea (1.8), eggs-chicken (1.8), peanut (1.8), beet-sugar-root (1.7), garlic-bulb (1.7), lentil (1.6), spearmint (1.5), milk (1.3), mustard-oilseed (1.2), onion-bulb (1.2), pepper-non-bell (1.2) and rice (1.1). MRL standards in Canada on five products are similar to the Codex MRL measure commodities like coconut, cucumber, mango, sesame-seed and sugar cane.

Further, eight products had MRL standards less than the Codex prescribed level. However, in five agricultural products out of these eight products coffees, cardamom, cumin-seed, pepper-spice and saffron, Canada had a greater number of MRL standards than what was prescribed by Codex. It suggests that for these five products, the scenario of market access is opaque as per the SPS Agreement. The only liberal market access commodities are three agricultural products that are cashew, walnut and tea, for which Canada has lower MRL standards. In case of five products, there is some amount of certainty on market access, however in other products listed under the category of 'below one,' there is an ambiguity on market access for Indian exports. The Canadian have a considerable high

usage of MRL standards on active ingredients, which are not present in the existing list of active ingredients of the Codex Alimentarius, suggesting the use of non-codex MRL standards.

5.6. Australian MRL Standards Regime on Active Ingredients

Australian ranked at 20th position among the global economies with US$ 222 million with a share of 1.5 percent of India's total agricultural and allied sector exports. The Australian Government regulates food and feed safety through the Department of Agriculture and Water Resources (DAWR), which is responsible for the inspection and sampling of imported food and feed. Food and feed imported into Australia are subject to requirements under the 'Quarantine Act' (1908) and the 'Imported Food Control Act' (1992), which are implemented by the DAWR. Australia applies food standards under the Imported Food Control Act and standards set down in the 'Code'. At the border, the role of the DAWR, concerning imported foods, state and territorial food enforcement agencies are responsible for enforcing the requirements of the 'Code' for all food available for sale within their jurisdiction, including both imported and domestically produced food.[62] FSANZ (Food Standards Australia New Zealand) develops the food standards with advice from other government agencies and inputs from stakeholders.

Food standards cover the use of ingredients, processing aids, colourings, additives, vitamins and minerals and cover the composition of some foods, such as dairy, meat and beverages as well as new technologies such as novel foods. The Act is also responsible for the labelling of both packaged and unpackaged food, including specific mandatory warnings or advisory labels. Public input is an important part of any decision-making process in food and pet safety regulations.[63] The feeds in the caser of Australia is legislated under the Animal Feed Act No 15 of 1986.[64]

Australia (Table 15), it was observed that the selected 33 agricultural products have an overall average[65] measure of stringency of 4.4 times.

---

62 http://www.foodstandards.gov.au/about/foodenforcementcontacts/pages/daff.aspx

63 http://www.foodstandards.gov.au/about/safefoodsystem/Pages/default.aspx

64 The Act regulates, supervises and control the manufacture, sale and distribution of Animal Feed and to provide for matters connected there with or incidental there to covering Animal feed manufacturers; Animal Feed/Raw material Importers; Dealers AF & RM; Sellers and Exporters.

65 It is the simple average as the one used in the case of tariff negotiations. This is the universal approach adopted, however it is important to put it this paper that there are imbalances, which are inherent with this approach. There is no suggestion of ruling out of high and low values of stringency across the number of active ingredients analysed. To address this issue we could introduce standard deviation (Stdev.) or co-efficient of variation (CoV) for each of the observations.

Australia has five times stringent MRL standards in comparison to the Codex Alimentarius standards.

Table 15: Australia MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average Stringency
	Codex Standards	Australian Standards	MRL equal to or less Stringent than Codex	More Stringent MRL than Codex	
1	*2*	*3*	*4*	*5*	*6*
Rice	32	45	16	9	21.1
Guar	10	28	4	5	16.4
Barley, grain	38	68	17	17	13.3
Beet, sugar, root	32	25	10	4	12.8
Sugar cane	13	25	3	6	10.6
Turmeric, root	10	21	2	2	10
Mango	13	23	9	2	6.9
Wheat, grain	53	87	25	22	5.2
Soybean	50	60	25	10	5.0
Spearmint	8	17	2	2	4.5
Tea, leaves	4	5	1	1	4.5
Mustard(oilseed)	6	9	1	2	4.3
Sesame, seed	4	10	1	2	4.3
Cattle, meat	85	119	33	38	4.2
Chickpea	26	60	14	4	3.5
Onion, bulb	41	40	17	10	3.0
Coconut	6	9	2	3	2.9
Lentil	23	50	12	6	2.9
Eggs, chicken	49	59	28	9	1.8
Garlic, bulb	18	36	7	4	1.8
Milk	91	120	48	26	1.8
Pepper, non-bell	57	51	19	12	1.8
Nut, cashew	39	26	11	4	1.7
Peanut	36	39	10	7	1.7
Walnut, (Persian)	48	34	13	4	1.6
Cucumber	64	58	33	7	1.2
Cardamom	1	3	1	--	1.0
Corn, grain	53	79	32	10	1.0
Cumin, seed	1	3	1	--	1.0
Pepper (spice)	1	2	1	--	1.0
Grape, table	72	97	51	13	0.9
Coffee bean, green	4	6	1	--	0.1
Saffron	1	2	--	--	0.0
Total	**989**	**1316**	**450**	**241**	**4.4**
Shares in Percent	**100**	**133**	**46**	**24**	

Source: Based on Global MRL Database extracted on 21-08-2015.

In 26 agricultural products, the MRL standards of Australia was more stringent than the Codex (with a value of more than one), suggesting that in these products import was possible only if they were compliant. Therefore, technically, Australia can deny market access citing the reasons of food safety (under the SPS Agreement). Stringent SPS-based MRL standard used for restricting and regulating imports used systematically to restricting market access later gets qualified and accepted as trade policy instruments.

In Australia, the agricultural crop rice is the most protected with MRL standards which are 21 times higher over the Codex MRL standard. The

other products which were having MRL standards above ten times were: guar (16.4), barley-grain (13.3), beet-sugar-root (12.8), sugar cane (10.6) and turmeric-root (10). Those below ten times were mango (6.9), wheat-grain (5.2), soybean (5), spearmint (4.5), tea-leaves (4.5), mustard-oilseed (4.3), sesame-seed (4.2), cattle-meat (4.2), chickpea (3.5), onion-bulb (3), coconut (2.9), lentil (2.9), eggs-chicken (1.8), garlic-bulb (1.8), milk (1.8), pepper-non-bell (1.8), nut-cashew (1.7), peanut (1.7), nut-walnut-Persian (1.6) and cucumber was the least with 1.2 times the Codex standard. Four Australian agricultural products that identified to be equal to Codex standards are cardamom, corn-grain, cumin-seed and pepper (spice). While, Australian MRL standards for three products was less than what prescribed under the Codex and these agricultural products are Grape Table, Coffee-bean-green and Saffron.

In summary, in Australia, there are only seven products where several MRL standards on active ingredients are lower than the Codex, but all of these had stringent MRL standards (more than one times). These products are Beet, sugar, onion, pepper, non-bell, nut, cashew, peanut, walnut (Persian) and cucumber. For the selected 33 agricultural products, Australian had 1,316 MRL standards, which is 327 counts higher than the Codex MRL Standards of 989 counts. It suggested the prevalence of non-Codex MRL standards across the products in which India has an export interest. Australia, in one look, focused on targeting imported rice to meet its very high food safety standard and thereby protects its citizens from substitutable cereal product for wheat.

5.7. Brazilian MRL Standards Regime on Active Ingredients

Brazil ranked at 34th position among the global economies with nearly US$ 60 million with a meagre share of 0.2 percent of India's total agricultural and allied sector exports.

Brazil has three levels of government: federal, state and municipal. Legally, federal regulations must follow when there are conflicts between federal, state and municipal legislation, or between regulations established by different Ministries at the federal level. State and municipal governments also have the authority to regulate and enforce state and municipal laws.

In the federal government, numerous agencies and several Ministries share jurisdiction for ensuring the safety of domestic food supply and regulating imported agricultural commodities and foods. However, the Ministry of

Agriculture, Livestock, and Food Supply (MAPA) and the Ministry of Health (MH) jointly through its National Agency of Sanitary Surveillance (ANVISA) are the primary regulators of agricultural products. MAPA oversees and enforces a large number of regulations about production, marketing, import and export of animal origin products, fresh fruit and vegetables, alcoholic beverages, juices, grains, seeds, and animal feed (including pet food). The ANVISA enforces most regulations regarding processed food products. MAPA's, search tool "SISLEGIS" makes available the current regulations on products that are under MAPA's supervision. A similar search tool called VISALEGIS can be found at ANVISA's. Like Japan, Brazil's legislation also follows the principle of "positive legislation" in terms of the enforcement of sanitary requirements. Only those agricultural commodities expressly established can be practised and allowed for imports and the others prohibited in the domestic market.[66]

The observation from Table 16, suggests that Brazil maintains stringency of nearly 3.7 times in the case of 33 agricultural products. It suggests Brazil had almost four times stringent MRL standards when compared with that of Codex. The impact of this was felt on 14 agricultural products that had values more than one. The agricultural products impacted were wheat-grain (16.3), garlic-bulb (10.6), rice (8.4), onion-bulb (5.8), coffee-bean-green (5.7), barley-grain (5.4), grape-table (5.1), cucumber (4.3), sugarcane (4.3), soybean (4.2), corn-grain (4), pepper-non-bell (4), peanut (2) and mango (1.3). The market access for these fourteen products was only possible if they complied with the stringent MRL standards. Brazil can technically deny market access citing the reasons of food safety (under the SPS Agreement).

Table 16: Brazil's MRL Standards and Stringencies

Agricultural products	Number of MRL Standard on Active Ingredients				Average of Stringency
	Codex Standards	Brazilian Standard	Equal to or less Stringent than Codex	More Stringent than Codex	
Wheat, grain	53	71	37	15	16.3
Garlic, bulb	18	27	11	6	10.6
Rice	32	50	22	9	8.4
Onion, bulb	41	55	27	13	5.8
Coffee bean, green	4	15	1	2	5.7
Barley, grain	38	43	29	8	5.4
Grape, table	72	79	46	21	5.1

[66] Grains Report, 2011, Brazil Food and Agricultural Import Regulations and Standards – Narrative, FAIRS Country Report, https://gain.fas.usda.gov/Recent%20GAIN%20Publications/

Cucumber	64	65	36	21	4.3
Sugar cane	13	35	7	6	4.3
Soybean	50	99	26	22	4.2
Corn, grain	53	85	37	14	4.0
Pepper, non-bell	57	52	43	7	4.0
Peanut	36	46	30	4	2.0
Mango	13	18	9	4	1.3
Beet, sugar, root	32	31	31	--	1.0
Cardamom	1	1	1	--	1.0
Cattle, meat	85	83	83	--	1.0
Chickpea	26	24	24	--	1.0
Coconut	6	6	5	--	1.0
Cumin, seed	1	1	1	--	1.0
Eggs, chicken	49	49	49	--	1.0
Guar	10	10	10	--	1.0
Lentil	23	23	22	--	1.0
Milk	91	88	88	--	1.0
Nut, cashew	39	38	36	--	1.0
Walnut, (Persian)	48	45	45	--	1.0
Pepper (spice)	1	1	1	--	1.0
Saffron	1	1	1	--	1.0
Sesame, seed	4	4	4	--	1.0
Spearmint	8	7	7	--	1.0
Tea, leaves	4	4	4	--	1.0
Turmeric, root	10	9	9	--	1.0
Mustard (oilseed)	6	6	6	--	0.8
Agri. Products	**989**	**1171**	**788**	**152**	**3.7**
Shares in Percent	**100**	**118**	**67**	**19**	

Source: Based on Global MRL Database extracted on 21-08-2015.

Eighteen agricultural products out of selected 33 agricultural products had MRL standards identical with the Codex (equal to Codex), and these were beet- sugar-root, cardamom, cattle-meat, chickpea, coconut, cumin, seed, eggs, chicken, guar, lentil, milk, nut, cashew, nut-walnut-Persian, pepper-spice, saffron, sesame-seed, spearmint, tea-leaves and turmeric-root qualified to be imported.

Brazil offers much hope for Indian exports as 67 percent of MRL standards are falling under the MRL standard that is not stringent. Further, of the total 1,171 Brazilian MRL standards, only 182 counts can be identified as non-Codex MRL standards. Although this suggested the prevalence of non-Codex MRL standards across the products in which India has an export Interest. The agricultural products in which these were on, wheat (grain), garlic (bulb), rice, onion, coffee bean, barley (grain), grape, cucumber, sugar cane, soybean, corn, grain, peanut and mango. Brazil had a single agricultural product with lower stringency when compared with the Codex level, and that is mustard-seed. The market access was available for nearly 70 percent of the Codex MRL standards, and it's not available for nearly 20 percent of the MRL standards. In conclusion, it can be said that in nineteen

agricultural products with no stringency in MRL standards, the market is accessible in Brazil.

5.8. Chilean MRL Standards Regime on Active Ingredients

Chile ranked at the 49th position among the global economies with nearly US$ 17.4 million and with a meagre share of 0.1 percent of India's total exports of Agricultural and allied products.

Chile actively participates in the World Trade Organization and the CODEX Alimentarius Commission. Chile is concerned that unscientific technical trade barriers may adversely affect its exports. As a result, the government supports the global standardization of sanitary and phytosanitary trading regulations. The Ministry of Agriculture coordinated the Chilean CODEX Committee under the new Chilean Agency for Quality and Food Safety (ACHIPIA). [67] Overall, the average measure of stringency was 2.5 times in the case of Chile (Table 17). Suggesting that when compared to the international standard, the Chiles markets are nearly three times stringent. In Chile, the MRL standard for 14 products has higher values with more than one. Suggesting, Chile's imports under 14 agricultural products will only be allowed if there was compliance with the national Chilian SPS-based MRL that is more stringent.

Chile's MRL standards qualified 19 products as the agricultural products like Barley-grain, Cardamom, Chickpea, Coconut, Coffee bean-green, Corn-grain, Cumin-seed, Guar, Mustard-oilseed, Nut-cashew, Peanut, Pepper (spice), Saffron, Sesame-seed, Spearmint, Sugar-cane, Tea-leaves, Turmeric-root and Wheat-grain. It suggests that nineteen products had market access under the SPS based MRL standards regime in Chile. Probably the usage of the Codex list of MRL standard on active ingredients is very low with a ratio[68] of 0.07 by the Chilean MRL regime.

Table 17: Chilian MRL Standards and Stringencies

Agricultural products	Count of Active Ingredients				Average of Stringency
	Codex Standards	Chilean Standard	MRL equal to or less Stringent than Codex	Stringent MRL than Codex	
Lentil	23	47	19	4	10.4
Pepper, non-bell	57	81	42	15	8.0
Beet, sugar, root	32	46	22	10	5.3

[67] Grains Report, 2015, Chile Food and Agricultural Import Regulations and Standards – Narrative, FAIRS Country Report, https://gain.fas.usda.gov/Recent%20GAIN%20Publications/

[68] This ratio provides a measure of probable usage of internationally harmonised list of active ingredients in the MRL standards of the country.

Grape, table	72	85	65	7	4.2
Mango	13	31	11	2	4.1
Cattle, meat	85	93	75	10	3.9
Rice	32	39	28	4	2.6
Cucumber	64	81	56	8	1.7
Eggs, chicken	49	56	46	3	1.6
Nut, walnut, (Persian)	48	66	43	5	1.6
Milk	91	99	82	9	1.2
Onion, bulb	41	52	38	3	1.2
Garlic, bulb	18	47	16	2	1.1
Soybean	50	50	49	1	1.1
Barley, grain	38	38	38	--	1.0
Cardamom	1	1	1	--	1.0
Chickpea	26	26	25	--	1.0
Coconut	6	6	6	--	1.0
Coffee bean, green	4	4	4	--	1.0
Corn, grain	53	53	53	--	1.0
Cumin, seed	1	1	1	--	1.0
Guar	10	10	10	--	1.0
Mustard(oilseed)	6	6	6	--	1.0
Nut, cashew	39	39	39	--	1.0
Peanut	36	36	36	--	1.0
Pepper (spice)	1	1	1	--	1.0
Saffron	1	1	1	--	1.0
Sesame, seed	4	4	4	--	1.0
Spearmint	8	8	8	--	1.0
Sugar cane	13	13	13	--	1.0
Tea, leaves	4	4	4	--	1.0
Turmeric, root	10	10	10	--	1.0
Wheat, grain	53	59	52	1	1.0
Grand Total	**989**	**1193**	**904**	**84**	**2.5**
	100	**121**	**76**	**9**	

Source: Based on Global MRL Database extracted on 21-08-2015.

5. 9. Indian MRL Standards Regime on Active Ingredients

In this paper, the case of India is highlighted and provides a comparison with the scale of stringent MRL standards across nine countries in a similar set of agricultural products. In India, the regulation of food and feed is set both by mandatory standards and by voluntary standards. The Bureau of Indian Standards (BIS) deals with all subjects excluding Drugs & pharmaceuticals, environmental (ambient & emission) norms, grading of agricultural products and have more than 20,000 voluntary standards (including 10,056 products standards) and 146 plus mandatory standards. The Government of India under the APEDA Act passed by the Parliament in December 1985 established the Agricultural and Processed Food Products Export Development Authority (APEDA). APEDA is responsible for standards on organic production and systems (under the National Programme for Organic Production (NPOP).

Table 18: India's MRL Standards and Stringencies

Agricultural products	Count of Active Ingredients	Average of

	Codex Standards	Indian Standard	MRL equal to or less Stringent than Codex	Stringent MRL than Codex	Stringency
Wheat, grain	53	60	39	11	7.0
Rice	32	36	27	3	2.6
Tea, leaves	4	5	3	1	2.6
Grape, table	72	74	64	4	1.9
Cattle, meat	85	84	79	5	1.5
Onion, bulb	41	41	38	1	1.4
Barley, grain	38	38	32	3	1.2
Chickpea	26	32	22	1	1.2
Lentil	23	29	20	1	1.2
Corn, grain	53	51	44	4	1.1
Milk	91	89	84	5	1.1
Soybean	50	55	44	3	1.1
Beet, sugar, root	32	35	32		1.0
Cardamom	1	1	1		1.0
Coconut	6	5	5		1.0
Coffee bean, green	4	4	3		1.0
Cumin, seed	1	1	1		1.0
Eggs, chicken	49	49	49		1.0
Garlic, bulb	18	21	16		1.0
Guar	10	14	10		1.0
Nut, cashew	39	36	36		1.0
Nut, walnut,(Persian)	48	45	45		1.0
Peanut	36	38	36		1.0
Pepper (spice)	1	1	1		1.0
Pepper, non-bell	57	57	50	2	1.0
Saffron	1	1	1		1.0
Spearmint	8	7	7		1.0
Sugar cane	13	14	12		1.0
Turmeric, root	10	10	10		1.0
Cucumber	64	63	59		0.9
Mango	13	14	12		0.9
Mustard seed (oilseed)	6	6	6		0.9
Sesame, seed	4	4	4		0.9
Grand Total	**989**	**1020**	**892**	**44**	**1.5**
	100	**103**	**87**	**5**	

Source: Based on Global MRL Database extracted on 21-08-2015.

The third leg is the Food Safety and Standards Authority of India (FSSAI) under the administrative jurisdiction of Ministry of Health & Family Welfare, Government of India has been established under Food Safety and Standards Act, 2006 which consolidates several legacy acts and orders related to food that have hitherto handled in various Ministries and Departments under a single legislation.

The FSSAI Act is a bucket for all the older laws, rules and regulations for food safety. The FSSAI Act took eight older acts into one umbrella, and the legislations are Prevention of Food Adulteration Act (1954), Fruit Products Order (1955), Meat Food Products Order (1973), Vegetable Oil Products (Control) Order (1947), Edible Oils Packaging (Regulation) Order (1988),

Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order (1967) and Milk and Milk Products Order (1992). FSSAI is responsible for protecting and promoting public health through the regulation and supervision of food safety and implemented from 2011.

The FSSAI has prescribed standards for multiple food products like Dairy products and analogues, fats, oils and fat emulsions, fruits and vegetable products, cereal and cereal products, meat and meat products, fish and fish products, sweets & confectionery, sweetening agents including honey, Salt, spices, condiments and related products, beverages, (other than dairy and fruits & vegetables based), other food product and ingredients, proprietary food and irradiation of food.

An analysis of Table 18, clearly reveals that in the selected 33 agricultural products, India is second from the bottom with stringency at 1.5 times, Malaysia having the lowest stringency of 1.2 times. India has had higher MRL standards than the prescription of the Codex Alimentarius for 12 agricultural products, and the list contains wheat-grain (7), rice (2.6), tea, leaves (2.6), grape-table (1.9), cattle-meat (1.5), onion-bulb (1.4), barley-grain (1.2), chickpea (1.2), lentil (1.2), corn-grain (1.1), milk (1.1) and soybean (1.1). Imports could be allowed for these products, only when they meet these stringent MRL measures. Therefore, India can technically deny market access, citing the reasons for food safety. The stringent MRL standards were restricting market access that would otherwise qualify to be a violation of the SPS Agreement – in the case of India, and such measures are moderate. The gap being low as the deviation are manageable and easily be harmonised to international standards. India has seventeen agricultural products with MRL standards equal to the Codex standard. These are beet-sugar-root, cardamom, coconut, coffee-bean-green, cumin-seed, eggs-chicken, garlic-bulb, guar, nut-cashew, nut-walnut-Persian, peanut, pepper (spice), pepper-non-bell, saffron, spearmint, sugarcane and turmeric-root. Additionally, four agricultural products had less than what was prescribed by the Codex, and these are Cucumber, Mango, Mustard-oilseed and Sesame-seed. Therefore, with 87 percent of MRL standards with lower or equal to the Codex standards and only 5 percent MRL standards among the category of stringent measure, India provided market access for all imports. India had the second most liberal market after Malaysia concerning the SPS based MRL standards among the ten countries analysed in this paper.

5.10. Summary of the Ten Markets for Average MRL Stringencies

Summary analysis of MRL national standards in terms of particle per million (PPM) on 33 selected agricultural products across ten countries further reveals that the Australian market is most stringent with 11 products having the highest recorded average MRL across all the ten markets in a particular product. Countries which followed Australia were the European Union (7 products), Brazil (5 products), both Mexico and the United States each with three agricultural products. Both Chile and Canada had two agricultural products with highest average MRL standards across the ten markets.

In Australia the choice of agricultural products with highest average MRL standards across the selected markets was beet sugar (12.8 ppm), coconut 2.9 ppm), guar (16.4 ppm), mango (6.9 ppm), milk (1.8 ppm), mustard-oilseed (4.3 ppm), sesame seed (4.3 ppm), spearmint (4.5 ppm), sugar cane (10.6 ppm), tea leaves (4.5 ppm and turmeric, root (10.0 ppm). Some of these protected crops were to prevent other countries from establishing a substitutable product or production value chain in commodities in which Australia had the upper hand.[69]

The second most important country in terms of SPS based MRL standards was the European Union with seven products. These products are chickpea (6.9 ppm), cucumber, (7.6 ppm), grape table (38.7 ppm), nut cashew (2.7 ppm), walnut (Persian) (2.7 ppm), rice (22.6 ppm) and soybean (7.0 ppm).

[69] Classic example is the case of beet sugar and sugar cane protection this is keep away the direct competition and competition from the substitutable product of cane sugar. As Australia has clear upper hand in the global market when it comes to cane sugar, while the United States in beet sugar. The Australian cane-growing sector is one of the most progressive agricultural industries in the world. Huge amounts of time and energy have been channeled into research and development to improve farming practices.

Table 19: Summary of Average MRL Standards on Agricultural Products (PPM)

Agricultural products	Australia	Brazil	Canada	Chile	EU	India	Japan	Malaysia	Mexico	USA
Rice	21.1	8.4	1.1	2.6	22.6	2.6	13.6	1.3	11.8	11.8
Guar	16.4	1.0	5.7	1.0	2.6	1.0	6.0	1.1	5.9	5.9
Barley, grain	13.3	5.4	13.7	1.0	3.9	1.2	1.2	1.0	8.2	8.2
Beet, sugar, root	12.8	1.0	1.7	5.3	1.3	1.0	3.2	1.0	1.5	1.5
Sugar cane	10.6	4.3	1.0	1.0	2.8	1.0	0.8	0.9	1.3	1.3
Turmeric, root	10.0	1.0	2.3	1.0	0.9	1.0	0.3	1.0	3.2	3.2
Mango	6.9	1.3	1.0	4.1	0.9	0.9	2.6	0.9	0.4	0.4
Wheat, grain	5.2	16.3	4.8	1.0	4.2	7.0	1.4	1.0	3.5	3.5
Soybean	5.0	4.2	2.3	1.1	7.0	1.1	1.1	1.0	2.2	2.2
Spearmint	4.5	1.0	1.5	1.0	0.8	1.0	0.0	1.0	1.4	1.4
Tea, leaves	4.5	1.0	0.0	1.0	1.1	2.6	4.0	2.6	0.7	0.7
Mustard (oilseed)	4.3	0.8	1.2	1.0	1.0	0.9	0.2	1.0	0.9	0.9
Sesame, seed	4.3	1.0	1.0	1.0	1.1	0.9	0.8	1.0	0.6	0.6
Cattle, meat	4.2	1.0	6.7	3.9	4.0	1.5	5.3	1.3	5.1	5.1
Chickpea	3.5	1.0	1.8	1.0	6.9	1.2	2.0	0.9	1.9	1.9
Onion, bulb	3.0	5.8	1.2	1.2	3.6	1.4	0.8	1.0	1.0	1.0
Coconut	2.9	1.0	1.0	1.0	0.7	1.0	0.8	1.0	1.5	1.5
Lentil	2.9	1.0	1.6	10.4	3.0	1.2	1.4	0.9	1.5	1.5
Eggs, chicken	1.8	1.0	1.8	1.6	1.7	1.0	0.9	1.0	3.3	3.3
Garlic, bulb	1.8	10.6	1.7	1.1	0.9	1.0	0.8	1.0	1.5	1.5
Milk	1.8	1.0	1.3	1.2	1.1	1.1	1.5	1.0	1.2	1.2
Pepper non-bell	1.8	4	1.2	8.0	7.9	1.0	1.1	1.3	3.0	3.0
Nut, cashew	1.7	1.0	0.9	1.0	2.7	1.0	0.8	1.0	1.1	1.1
Peanut	1.7	2	1.8	1.0	1.2	1.0	1.0	1.0	1.6	1.6
Nut, walnut, (Persian)	1.6	1.0	0.9	1.6	2.7	1.0	1.3	1.0	1.4	1.4
Cucumber	1.2	4.3	1.0	1.7	7.6	0.9	0.6	1.0	1.9	1.9
Cardamom	1.0	1.0	0.0	1.0	1.0	1.0	0.8	1.0	1.0	1.0
Corn, grain	1.0	4.0	2.0	1.0	1.8	1.1	0.9	1.2	1.7	1.7
Cumin, seed	1.0	1.0	0.0	1.0	1.0	1.0	0.8	1.0	4.0	4.0
Pepper (spice)	1.0	1.0	0.0	1.0	1.0	1.0	0.8	1.0	1.0	1.0
Grape, table	0.9	5.1	2.0	4.2	38.7	1.9	0.7	1.0	2.4	2.4
Coffee bean, green	0.1	5.7	0.3	1.0	3.1	1.0	0.9	1.0	0.9	0.9
Saffron	0.0	1.0	0.0	1.0	1.0	1.0	0.8	1.0	1.0	1.0
Count of Top Avg.	**11**	**5**	**2**	**2**	**7**	**0**	**0**	**0**	**3**	**3**
Average	**4.4**	**3.7**	**2.7**	**2.5**	**6.8**	**1.5**	**1.9**	**1.1**	**2.8**	**2.8**
St.dev.	**5.0**	**3.4**	**2.6**	**2.2**	**7.4**	**1.1**	**2.5**	**0.3**	**2.4**	**2.4**
C.o.V.	**114.4**	**92.7**	**96.0**	**87.4**	**108.7**	**73.1**	**132.4**	**26.6**	**84.9**	**84.9**

Source: Based on Global MRL Database extracted on 21-08-2015.,

In the case of European Union protection of grapes is for the wine industry and rice for reasons like the preservation of socio-cultural and ecology of the region growing rice.[70] Brazil is the third country with the highest average MRL standards across the selected markets with five products. These products are coffee bean (5.7ppm), corn-grain (4.0 ppm), garlic-bulb (10.6 ppm)[71], onion bulb (5.8 ppm) and wheat, grain (16.3 ppm). In some countries, economically important crops protected for obvious reasons.

In Mexico and the US, three products like cumin-seed (4 ppm), eggs-chicken (3.3 ppm) and rice (11.8 ppm) are with highest average MRL standards. Two agriculture products each for Chile like lentil (10.4 ppm) and pepper non-bell (8 ppm) and Canada barley grain (13.7 ppm) and cattle, meat (6.7 ppm) have highest average MRL standards. Analysis of 33 agricultural products in table 19 reveals that Japan, India and Malaysia were countries with none of the agricultural products with top MRL standards; incidentally, the three countries belong to the Asian continent. Therefore, although countries using multiple trade policy strategies for protection, and it is not always necessary that all of them are using MRL standards for the purpose. Tariff rate quotas, non-ad-valorem tariffs and seasonal tariff would achieve the same goal. However, what is evident from the available facts that two important strategies have MRL standards, which are applying higher standards on substitutable products and similarly on products with higher domestic cost in terms of the value of production and area of cultivation. Table 19 reveals that cereals like rice, barley-grains and wheat, in the spice's category Garlic-bulb and Turmeric-root, in the pulse's category gaur, soybean and lentils and finally in the fruits and vegetable products like grape-table, beet sugar and sugarcane have stringent MRL standards in the developed countries.

6. Presence of Non-Codex MRL Standards

The non-Codex MRL standards are the MRL standards on active ingredients for which there are no Codex MRL standards to harmonise at the international level. Such MRL standards are those for which there is no

[70] Though neither a staple food nor a major crop in Europe, rice has an important sociocultural significance and ecological importance in several Mediterranean countries of Europe. Per capita annual consumption ranges from 3.5 to 5.5 kg of milled rice in non-Rice-growing countries of northern Europe and up to 6–18 kg in southern Europe.

[71] Garlic is the fifth most economically important vegetable in Brazil and is frequently infected by a complex of different viruses that cause significant degeneration of the crop under field conditions.

comparable MRL standard by Codex on the active ingredient. This aspect of MRL standards has never highlighted, and there is complete darkness on its existence in the literature. By doing so, we think there would be more clarity in the understanding of SPS based MRL standards and a completely new phenomenon of information asymmetry

The analysis in this section, divided into two segments, and the first segment deals with the limited set of 33 agricultural products and the presence of non-Codex MRL standards. While the second segments address the macro picture and the total number of agricultural products differing from country to country (see Table 3).

MRL stringencies represented in terms of times and terms of deviation from Codex for each country. To calculate the same, we need two information, one national MRL standards and Codex MRL standards. We arrive at stringency indicator, based information for every MRL standards and averages for each agricultural products and country. What happens when no such reference values exist for an agricultural product with an MRL standard?

Since there is no reference of Codex MRL-standards for these active ingredients or substances, the need to harmonise does not arise in these MRL standards. There is a need to introduce a new method of calculation, to bring forward the presence of non-Codex MRL standards in 33 agricultural products at the micro-level and the macro-level (all agricultural products). A simple compositional analysis applied for understanding the prevalence of non-Codex MRL standards to total MRL standards in the total MRL standards.

6.1. Selected Country Level

At the micro (10 country and 33 products) level the analysis of 33 agricultural products, highlight similarity in the pattern observed until now in the case of stringencies and other parameter taken-up for analysis. Market access in the United States restricted highly with 1,496 non-Codex MRL standards accounting for almost 60 percent of the total MRL standards. An impact on all the 33 products alike as across all the products, there are instances of non-Codex MRL standards, and hence the market access would remain opaque. Second place is the European Union Market with 1,244 non-Codex MRL Standards in comparison to 2,162 MRL standards, accounting for nearly 58 percent. In the EU market, all the 33

agricultural products have a higher number of EU MRL standards, suggesting that across all products, non-Codex MRL standards are prevalent. Thus the market access for nearly all products exported by India remains uncertain (Tables 20 & 12).

Table 20: Composition of Non-Codex MRL Standards

Country	Number of MRL Standards and Percentages			Rank
	National Standards	Non-Codex Standards	Non-Codex in Total Codex MRLs (%)	
	2	3	4=(3/2)	
U.S.& Mexico	2,479	1,496	60.3	1
European Union	2,162	1,244	57.5	2
Japan	2,014	1,103	54.8	3
Canada	1213	620	51.1	4
Australia	1316	625	47.5	5
Developed Markets	**9,184**	**5,088**	**55.4**	
Brazil	1171	231	19.7	6
Chile	1193	205	17.2	7
India	1020	84	8.2	8
Malaysia	1024	76	7.4	9
Developing Markets	**4,408**	**596**	**13.5**	
Non-Codex MRL Standards	**22,**776	**10,772**	**47.3**	

Source: Based on Global MRL Database extracted on 21-08-2015.

In terms of market access, Japan is in third place, with nearly 55 percent of non-Codex MRL standards (opaque). Of the 33 agricultural products exported from India with nearly 32 having higher Japanese MRL standards when compared to the corresponding Codex MRL standard, the only products Spearmint has complete market access as per the SPS based MRL Standards (Tables 20 &13).

Up to 51 percentages limit the presence of non-Codex MRL standards in the Canadian market. In terms of its influence on India's exports, it is limited to 19 products in which the number of Canadian MRL standards are larger than the Codex numbers, suggesting the prevalence of Non-Codex MRL standards. The Canadian market is opaque for nineteen products of India export interest Index agricultural products.

Fifth place in terms of non-Codex MRL standards is taken by Australia, with nearly 48 percent share in Australia's total MRL standards. In the Australian case, 27 products of the total selected 33 products to have non-Codex MRL standards. However, the remaining six products were products belonging to stringent MRL standards with values above 1.2 times. Australia is also an opaque market with multiple factors influencing the final market access. In general terms, the developed market is protected

with opaque SPS-based MRL measures with up to 55 percent in terms of the average number.

The non-Codex MRL standards in case of developing countries, on the other hand, is nearly 14 percent of the total MRL standards of four countries analysed (Brazil, Chile, India and Malaysia). The prominent user of non-Codex MRL standards among the developing countries is Brazil with 231 MRL standards belonging to the non-Codex category and accounting for a share of nearly 20 percent, followed by Chile with 17 percent on non-Codex standards and India and Malaysia with 8.2 and 7.4 percent respectively.

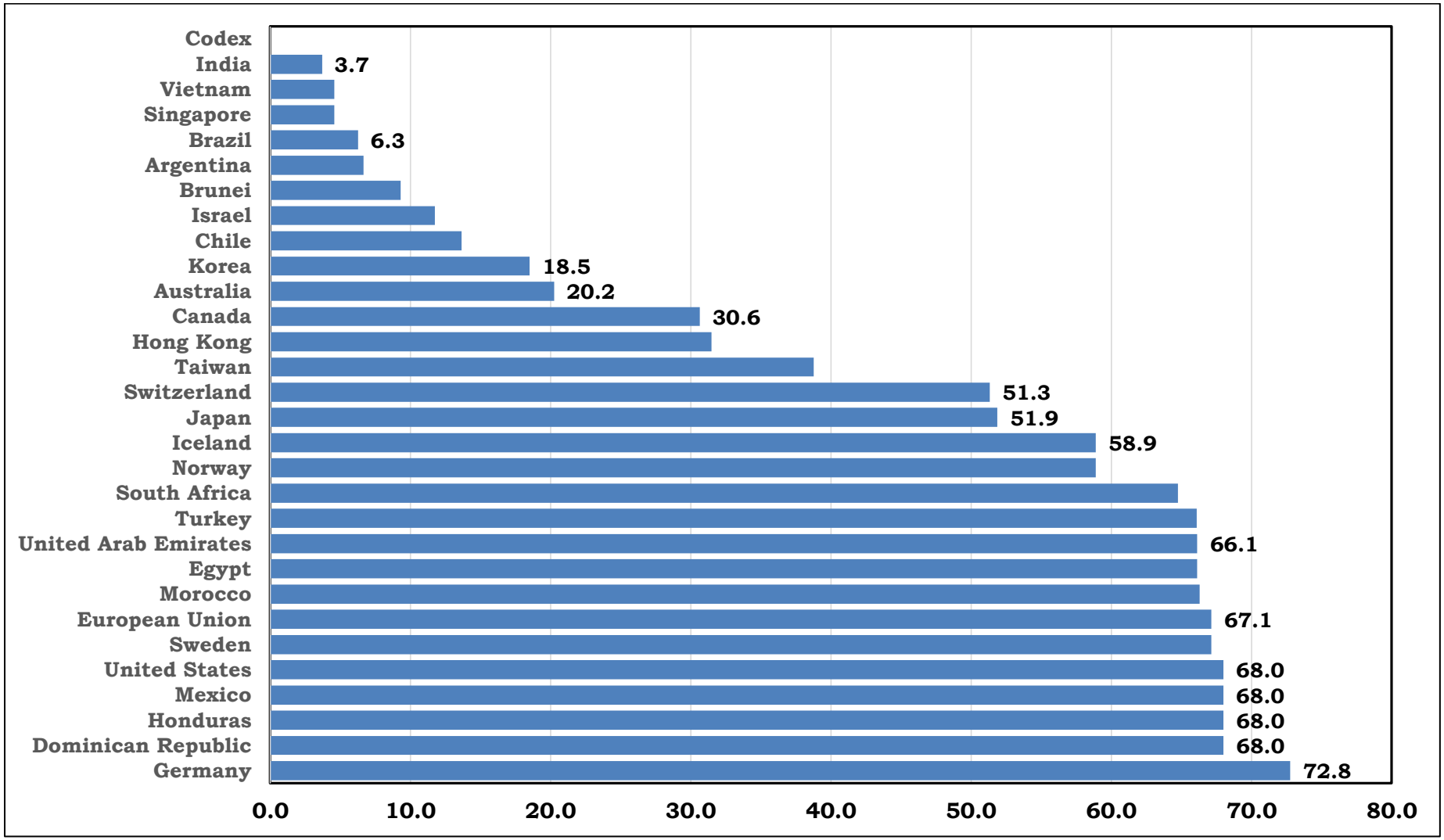
The developing countries excluding India accounted for nearly 15 percent share of non-Codex MRL standards. Summarising all the product-wise average of MRL standards on active ingredients. The developed countries markets are four times more stringent than developing countries markets for India's exports; it is evident with 56 percent of non-Codex MRL standards in the five developed markets in comparison to nearly 14 percent in three developing markets.

6.2. Country-wise Analysis

To understand the gravity of the imbalance in market access in the prominent 30 countries analysed on the application of SPS-based 'non-Codex MRL' standards. This subsection provides a macro picture by comparing 30 different countries usage of the non-price based (stringent and 'non-codex MRLs'). It is evident from section one that some of the countries have been very low protection in terms of price-based (tariff) protection. These are national MRLs not harmonised to the Codex MRLs. Based on the number of Codex active substances and the national total active substances, we arrived at what is referred to as non-codex MRL standards in figure 6.

Market access assessment based on the presence of non-Codex MRL Standards indicates that Germany has the highest barrier of 72.8 percent share of non-Codex MRL standard and India has the lowest barrier at 3.7 percent share of non-Codex MRL standard. Of the 76 countries with MRL standards, which were higher than the Codex MRL standards, there are countries with non-Codex MRL standards ranging from 0 to 73 percent were 49 countries and 27 of these had less than Codex MRL standard.

Figure 6: Percentage Shares of Non-codex MRL Standards to Total MRL Standards



Source: Calculated based on GlobalMRL Database

.

NAFTA has brought the United States and Mexico closer owing to trade ties which led to the adoption of commonality in terms of the SPS based measures. Further, this is certified by the trends in the shares of two NAFTA partners in terms of non-Coded MRL standards, with both having 68 percent shares. Similarly, the European Union has 67 percent non-Codex standards and its FTA partners like Norway (60 percent), Iceland (60 percent) and Switzerland having 51 percent shares. Therefore, the regional trade agreements (RTAs) seem to be playing a significant role in propagating similarities in standards, especially legislative SPS based standards. These SPS and technical barriers play a major role in determining de facto market access for goods, harmonising and streamlining these measures within trading blocs has the potential for boosting intraregional trade substantially (FAO, 2015). The alliance in terms of SPS-based MRL standards has the potential of an RTA sort of effect for the developed countries, while in the case of developing countries have been limited operating in the basic commodity market. Studies have highlighted that such barriers may be detrimental for small farmers as they might not be able to comply with such stringent requirements. The primary reason being the lack of technical and financial capacity (Reardon et al., 2001), which may induce traders and processing firms to reduce sourcing from small suppliers (Montalbano *et al.* 2015).

Section IV

This section attempts to provide some concluding remarks based on the empirical observations made in the previous sections and also provides inferences based more than two decades process of negotiations under the WTO. While the WTO negotiations under Doha Round (2001 to 2008) focused on the issue of market access under Agriculture and non-agriculture goods and the imbalance observed were primarily of two types. The first type is in terms of WTO grouping (the developed and developing countries) the issues were related to treatment differences in the reduction of tariffs across goods; mainly the agricultural (AoA) and non-agricultural (NAMA) sectors. The second imbalance is in the mechanisms put in place for the disciplining in tariff and non-tariff measures – there is no coherence in the reduction or harmonisation. Although the issues of NTMs have been lingering from the GATT rounds, the various committees of WTO only partially addressed it. These were systemic issues, mainly in the context of

transparency related issues under the Doha Round. The WTO over-emphasis in disciplining the tariff is not matched by its efforts on harmonisation or adopting a science-based approach in terms of disciplining the NTMs. The WTO negotiations set the directions and disciplines in both forms of market access barriers - tariffs and NTMs. However, the disciplines on the ad valorem tariffs are very onerous in comparison to non-Ad valorem tariffs rates. In the case of NTMs, the MRL standards on active ingredients set by Codex Alimentarius are similar to the bound tariffs in case of tariff disciplining.

There was a negative correlation between the movement of tariff and non-tariff measures. This was observed in the synchronised movements tariffs going southward and the non-tariff measures moving northward. This is the reality of global market access for goods in general. On the other hand, the agricultural and allied products were particularly severally affected; given that it was one sector in which the developing countries were expected to gain when tariffs dropped. This paper attempts to bring out the various shades of the market access reality.

The paper also emphasis on the growing usage of these SPS based measures and its restrictive impact on India's exports in agricultural and allied products. Further, this paper seeks to highlight additional issues mainly related to SPS based MRL standards: like the stringencies of national SPS measure over and above the Codex and additionally the presence of non-Codex MRL standards. The literature on non-Codex MRL standards is limited, and this paper may be the first one to reveal the usage of this SPS based restriction.

All the findings are preliminary and need more verification and methodological standardisation. The developed countries are found to be using the 'non-Codex MRL[72]' standard, excessive as effective barriers, to protect their market under a low tariff regime. It also actively creating a negotiating situation wherein, the developed countries encouraging further tariff reductions but failing to create a multilateral response mechanism (system) to counter the surge seen in various forms of SPS-based MRL standards applied through the active ingredients. Further, the deviations from international standards set by Codex could be considered similar to

[72] One of the four types of national MRLs which is not comparable with international standards (Codex MRL). The comparable are three others and they are 'less stringent than Codex'; 'more strigent than Codex' and 'equal to Codex'. The fifth type is the category wherein there are no national MRLs only the Codex maintains an MRLs for active ingredients in part per millons (PPMs).

using remedial trade measures or keeping products unbound in the tariff negotiations. In the case of MRL standards on active ingredients, the developed countries have consciously misled WTO negotiation process by tactfully creating ambiguities around the SPS agreement, especially the application of Articles 2 & 3 and particularly in Articles 5 & 7.

This study is one attempt to bring forward the nature of SPS-based MRL standards across major ten countries, accounting for nearly 40 percent of global trade. Although the whole study is based in it impart on 33 agricultural products of India's export interest. What are the permissible limits legally specified by the SPS Agreement of WTO and what have the countries been introducing as measures that may depart from a harmonised measure under the Codex. The gap in the WTO transparency provisions has allowed such notifications to be notified under regular of emergency SPS notifications; however, these need to be treated separately as the impact on developing country exports are significant.

7. Conclusions

Some of the non-tariff measures related aspects revealed in this report are the country-wise information on MRL standards; how these differ from international (Codex) standards. One other important aspect which the analysis will introduce is the existence of unevenness (non-harmonised) of the usage of non-Codex MRL standards across countries. National governments publish a significant share of these documents through a series of legislative changes mainly after the WTO negotiations which began in 1995. Therefore, such issues miss the negotiator vision as they are unable to contextualise the market access impact on imports, as they are often without trade links. In recent decades, there is a stark departure from the principles of liberalisation and harmonisation across the developed world, and such moves have been more pronounced.

Stringency SPS-based MRL measures were used for restricting market access, which would qualify the trade policy measure – which needs to be grounded in domestic economies. This provided an advantage for the developed countries with technologically bias against developing countries lacking it. Further, as it depended on the enforcement[73], to avoid the misuse favouring one party against the other a system of notification

[73] It is increasingly used as an effective geo-political tool in the hand of developed countries.

supported by Article 7 (transparency). Although the notification of all agricultural products was initiated by the Codex Regulation[74] dated 1997 only a few countries have taken clue.[75]

The primary empirical finding and trends from the paper are the following:

1. The average applied MFN tariffs in agricultural and allied products of the selected group of developing and developed countries have dropped from seventeen to eight percent and ten to five percent respectively from 1995 to 2015. The respective drop of nine and five percentage points, suggests that the developing countries were making much more average applied MFN tariff reduction (voluntarily) compared to the developed countries. It is important to also note, that much of the developed countries that are analysed in the paper were also using non-ad valorem - a non-transparent form of a tariff. As these are tariff rates expressed in textual form and not in numerical form, therefore escapes in the process of simple average calculations. Tariff lines in non-ad valorem forms applied by developed countries escape the arithmetic process of simple average calculation. It is evident in 2014 that many developed countries like Switzerland, European Union, United States, Japan and Canada had a very high percentage of NAVs tariff lines 74, 44, 41 29 and 20 percent of total agricultural and allied tariff lines (Table 2). In terms of total tariff line of agricultural and allied products, the majority of the five developed countries had a very high use of non-ad valorem tariff.
2. Bound tariff rates remain unchanged for the developing countries at 44.7 percent, and for the developed counties it increased from 5.4 in 1995 to 5.6 percent in 2015. The evidence on tariff negotiations under the Doha Round indicates that the progress was virtually static in terms of bound tariff rates. On the other hand, the average tariff saw a steep fall in developing countries and a marginal fall in developed countries. The market access for processed food products is non-transparent

[74] Codex, 1997, "Guidelines for the Exchange of Information between Countries on Rejections of Imported Food", CAC/GL 25-1997,

[75] European Union and the United States is seen to be providing considerable informations on import refusals.

(opaque) as the NAVs discourage cheaper imports, thereby indirectly encouraging domestic value addition.

3. Further, as the Agreement on Agriculture did allow supporting rural economies through policies that cause less distortion of trade. Countries erected SPS-based MRL standards which required mandatory compliance. Yearly notifications to the WTO increased from 201 in 1995 to 1,563 notification by 2015. Many of the SPS related import regulations have been legitimate protection against the spread of plant and animal diseases and against the imports of products that might threaten consumer health. Over time, with increased in deviations, a number of these import controls have been used as disguised trade barriers.
4. Two such disguised trade barriers are: 1) the stringent SPS-based MRL standards, and 2) the prevalence of non-Codex MRL standards across countries. The analysis of GlobalMRL database of 2015 suggests that most countries were at the extreme ends of the spectrum in terms of the SPS based MRL standards. It is, therefore, clearly revealed that market access was not achievable only by the reduction of tariffs. However, serious efforts have to be carried out concerning the growing market access barriers that mandated compliance with national standards. It has to understand that the developed countries are better placed in high-tech capabilities (labs) and products – however, most of these are unsustainable in the present global context.
5. India's exports in agricultural products faced the stringent SPS-based *MRL standards in three countries of the Quad group; European Union,* United States and Japan. Trends were accurate in terms of stringencies and the presence of non-codex MRL standards. Based on the current understanding of the SPS Agreement, the non-Codex MRL standards are trade restriction which needs further analysis. To understand the legal impunity which the large quantum of SPS-based non-Codex MRLs is applied. Therefore, this measure impacts trade negatively as already evident from the past literature.

6. While stringencies followed a common trend with most developed countries having stringent MRL standards when compared with developing countries, the presence of non-Codex MRL standards did not follow this trend. This evidence supports the arguments that regional trade agreements (RTAs) seem to be playing a significant role in propagating similarities in standards, especially legislative SPS based standards. These SPS and technical barriers play a significant role in determining de facto market access for goods, harmonising and streamlining these measures within trading blocs has the potential for boosting intraregional trade substantially.
7. Similarly, the developed countries allying terms of SPS measures can have the potential RTA sort of effect in the case of developing countries operating in that commodity market. Studies highlight that small farmers might be unable to comply with stringent requirements due to a lack of technical and financial capacity, which may induce traders and processing firms to reduce sourcing from small suppliers. JETRO is a document in 2011 said that imposing more strict regulations than the Codex standards could be considered as a non-tariff barrier (NTB).
8. Two compliance-related barriers are on the rise. Both of these are domestic measures disciplined by the SPS Agreement of the WTO and additionally by the three international bodies (Codex, OIE and IPPC). As these measures are created and implemented within countries' borders, so the solution also would naturally lye within the borders. Codex does have a mechanism of keeping a check on the importing activities by its members - the guideline on import refusals, which provide the basis for structured information exchange on rejections of imported food where the reason for the rejection is related to food safety and fair practices in food trade (Codex, 2016). Based on new evidence of the presence of non-Codex MRL standards, there is a need to update the assessments.
9. This study supports the claim that market access barriers are on the increase across the developed markets, in terms of stringency parameters (higher than Codex) and the presence of 'non-Codex MRL' standards. It suggests that as SPS-based MRLs are increasingly

becoming barriers as these are mandatory requirements and compliance with it is a must. This paper could be the first of its kind in the literature on NTMs and role as a barrier.

7.1 Policy Recommendations

1. The SPS Agreement under the Article 7 (transparency provision) makes it mandatory for members to notify the deviated MRLs with the application of non-codex MRLs and submission of such national legislation in the form of 'risk assessment dossier' at an appropriate forum.
2. Stringent (non-Codex MRLs) standard used for restricting and regulating if systematically is used to restrict market access – it may give the user (at a later stage) impunity as such barriers would remain qualified and accepted as trade policy instruments. There is a need to counter the tendency of non-compliant and legally violative measures accepted as new instruments for restricting imports.
3. A proposal on the replacement suggested in Annexure 1 (page 71) as a template for the 'one-page tariff profiling' of the WTO members, which would reveal the actual status of the non-ad-valorem tariffs.
4. Market surveillance, strengthen monitoring mechanism, and data gathering is increasingly becoming a vital part of the accurate assessment of market access. It can involve all levels of players (consumers, firms and industrial associations) both domestically and behind the borders (partner-country).
5. Further, such reporting should be regulated under the SPS committee, so that adequate market access is guaranteed. Such an exercise requires a considerable amount of public availability of information (similar to the tariff discipline or sometimes more) to help in the identification of SPS standard and its trade links (HS code). Information on the deviated standard would need to be systematically updated by members, specifically the dossier on the procedures followed for assessment of risk and scientific justifications.
6. At the sectoral level, there is a need for a separate body to coordinate the various data/information to assess market access barriers; the body should have a seamless working relationship with trade negotiators.

*****

References

Babili Mahmoud (2009), ***"Ad Valorem Equivalent in the WTO",*** NAPC Working paper no 43, Ministry of Agriculture and Agrarian Reform, National Agricultural Policy Center, December, http://ageconsearch.umn.edu/.

Bathan, Bates M. and Flordeliza A. Lantican, 2009, ***"Factors affecting yield performance of banana farms in Oriental Mindoro, Philippines***", Journal of International Society for Southeast Asian Agricultural Sciences, 15(1), 126–143.

Bovay John, 2016, ***"FDA Refusals of Imported Food Products by Country and Category, 2005–2013",*** United States Department of Agriculture, Economic Research Service, Economic Information Bulletin Number 151, March.

Clarke Renata, 2010, ***"Private Food Safety Standards: Their Role in Food Safety Regulation and their Impact"***, paper prepared for 33rd Session of the Codex Alimentarius Commission, FAO, see table 4-1, p.7-8.

Codex, 1997, "***Guidelines for the Exchange of Information between Countries on Rejections of Imported Food"***, CAC/GL 25-1997.

Cororaton Caesar B. and Everett B. Peterson, 2012, ***"Potential of Regional and Seasonal Requirements in US Regulation of Fresh Lemon Imports"***, The World Economy, Special Issue: NTMs, Agricultural and Food Trade, and Competitiveness, v.35 (8), pp. 1022–1036, August.

Crivelli Pramila and Jasmin Groeschl, 2016, "***The Impact of Sanitary and Phytosanitary Measures on Market Entry and Trade Flows***", The World Development, 30 (3), March, pp.444-473, https://doi.org/10.1111/twec.12283.

Daly Michael and Hiroaki Kuwahara, 1998, ***"The Impact of the Uruguay Round on Tariff and Non-Tariff Barriers to Trade in the 'Quad"***, The World Economy, 21(2), pp. 207–234, March.

Das Abhijit and Sachin Kumar Sharma, 2012, ***"Evolution of WTO Agriculture Modalities: Survival of the Financially Fattest"***, Occasional Paper 1, Centre for WTO Studies.

Dhar Biswajit and Murali Kallummal, 2007, ***"Taming Non-Tariff Barriers: can the World Trade Organization find a Solution?",*** Part V, Can non-tariff barriers be tamed, Studies in Trade and Investment, Future of Trade Research Areas that Matter for Developing Countries A Regional Perspective on Doha Development Agenda and Beyond, UNESCAP, Bangkok.

Disha, Jain, Kallummal Murali and Roy Shantanu De, 2017, "Impact of SPS-Based MRL Standards on Agro-Food exports from India to EU", TERI Dissertation, mimeo.

Downes, Chris, 2014, "***The Impact of WTO SPS Law on EU Food Regulations***" Studies in European Law and Regulation 2, Springer. ISBN 978-3-319-04373-9.

EC, 2000, "***White Paper on Food Safety***", Commission of the European Communities, Brussels, 12 January, COM (1999) 719 final, <http://ec.europa.eu/dgs/health_food-safety/library/pub/pub06_en.pdf>

EFSA, 2012, ***"Scientific Opinion on Risk Assessment Terminology"***, Scientific Opinion, EFSA Scientific Committee, European Food Safety Authority (EFSA), Parma, Italy.

Elms, Deborah K. and Patrick Low, 2013, ***"Global value chains in a changing world"*** (Ed.), Fung Global Institute (FGI), Nanyang Technological University (NTU), and World Trade Organization, WTO Secretariat, Switzerland.

European Parliament, 2015, "***Food Safety Policy and Regulation in the United States***", Study for the ENVI Committee, Directorate General of Internal Policies, Policy Department, Economic and Scientific Policy, http://www.europarl.europa.eu/RegData/etudes/STUD/2015/536324/IPOL_STU(2015)536324_EN.pdf

FAO, 1995, "***The State of Food and Agriculture***", FAO agriculture series, no. 28, Rome (Italy), ISBN 92-5-103700-0.

FAO, 2015, "Evolving Market Structures", p.8, ***"The State Of Agricultural Commodity Markets Trade and Food Security: Achieving a Better Balance between National Priorities and the Collective Good***", ISBN 978-92-5-108931-6.

Felt Marie-Hélène, Bruno Larue and Jean-Philippe Gervais, 2012, "***Compositional Standards, Import Permits and Market Structure: The Case of Canadian Cheese Imports***", The World Economy, Vol. 35, Issue 8, pp. 1053-1072.

Finger J. Michael and Ludger Schuknecht, 1999, ***"Market Access Advances and Retreats: The Uruguay Round and Beyond",*** September, http://www.iatp.org/files/Market_Access_Advances_and_Retreats_The_Urugua.htm.

Francis Smitha and Kallummal Murali (2013), "India's Comprehensive Trade Agreement: Implications for Development Trajectory", Special Article, Economic and Political Weekly, v 48 (31), pp August.

Guler Oker, 2002, ***"The WTO Agreement on Non-Tariff Barriers and the implication for the OIC Member States: Customs Valuation, Pre-Shipment Inspection, Rule of Origin and Import Licensing"***, Journal of Economic Cooperation, 23(1), pp.61-88.

Hughes Helen and Anne O. Krueger, 1984, ***"Effects of Protection in Developed Countries on Developing Countries' Exports of Manufactures"***, in the edited book by Baldwin Robert E. and Anne O. Krueger, "The Structure and Evolution of Recent U.S. Trade Policy", Editor, University of Chicago Press.

Humphrey John and Olga Memedovic, 2006, ***"Global Value Chains in the Agri-Food Sector"***, Working Paper, Strategic Research and Economics Branch, UNIDO, Vienna, Jha Shyam Narayan, 2016, *"Rapid Detection of Food Adulterants and Contaminants: Theory and Practice"* ISBN: 978-0-12-420084-5.

Jackson Lee Ann and Marion Jansen, 2009, ***"Risk Assessment in the International Food Safety Policy Arena can the Multilateral Institutions Encourage Unbiased Outcomes?"***, Economic Research and Statistics Division, Staff Working Paper ERSD-2009-01 January.

Kallummal Murali (2015), "***North-South Imbalances in the Doha Round: The Use of Specific Duties as a Trade Policy Instrument***", Agrarian South: Journal of Political Economy, 4(1), pp 85–124, DOI: 10.1177/2277976015574052.

Kallummal Murali and Gurung Hari Maya, 2015, "***The United States SPS Measures on Agricultural Products Imports on BRIICS Countries***", edited book by Sharma S.K, Kallummal M. and Roy, Agricultural and Trade: Emerging Issues and Challenges in India.

Kallummal Murali and Gurung Hari Maya 2015a, ***"Agricultural Exports from India: Addressing Challenges Arising from Stringent MRL-based Standards"***, Section 5, "Challenges for Checking WTO Compatibility", p.26, https://www.academia.edu/12870064/Addressing_Market_Access_Challenges_Arising_from_Stringent_MRL-_based_SPS_Standards.

Kallummal Murali and Hari Maya Gurung, 2015b, ***"Stringent MRL-Based Standards Addressing Challenges"***, Chapter 7, STANDARDS CONCLAVE 2015, 'Role of Standards in International Trade: Challenges, Opportunities and Issue', Conference volume published by Confederation of Indian Industries.

Kallummal Murali, 2015, ***"North-South Imbalance in Doha Round: The Use of Specific Duty as a Trade Policy Instrument"***, Agrarian South: Journal of Political Economy Vol. 4, Number 1 (ISSN: 2277-9760, online ISSN (2321-0281), Sage Publication.

Kallummal Murali, Aditi Gupta and Poornima Varma, 2012, '***Agricultural Trade from South-Asia and the Impact of SPS Measures: A Case Study European Rapid Alert System for Food and Feed (RASFF)***', Journal of Economic Policy and Research vol. 8 (2), pp. 40-75, ISSN 0975-8577.

MacLachlan, Dugald J. and Denis Hamilton, 2010, ***"Estimation methods for Maximum Residue Limits for pesticides"***, Regulatory Toxicology and Pharmacology, Volume 58, Issue 2, November 2010, Pages 208-218.

Matthews Alan, 2012, "***Will the Right Tariff Average Stand Up***?" http://capreform.eu/will-the-right-tariff-average-stand-up/.

Montalbano, Pierluigi, Silvia Nenci and Luca Salvatici, 2015, "***Trade, Value Chains and Food Security***", Background paper prepared for The State of Agricultural Commodity Markets 2015–16, Food and Agricultural Organisation of the United Nations (FAO) Rome.

Nedumpara, James J., 2016, *"**India-Agricultural Products: Defending India's First SPS Dispute**"*, Chapter 12, Das Abhijit and James J. Nedumpara (Eds) "WTO Dispute Settlement at Twenty: Insiders'Reflections on India's Participation", Springer, New Delhi.

Niven Winchester, et.all, 2012, "***The impact of regulatory heterogeneity on agri-food trade***", The World Economy 35 (8), 973-993.

Niven Winchester1, Marie-Luise Rau, Christian Goetz, Bruno Larue, Tsunehiro Otsuki, Karl Shutes, Christine Wieck, Heloisa L. Burnquist, Maurício J. Pinto de Souza and Rosane Nunes de Faria, 2012, *"**The Impact of Regulatory Heterogeneity on Agri-food Trade**"*, The World Economy, *Special Issue: NTMs, Agricultural and Food Trade, and Competitiveness*, v.35 (8), pp 973–993, August.

Orden, David, John Beghin and Guy Henry, 2012, *"**Key Findings of the NTM-IMPACT Project**"*, The World Economy, Special Issue: NTMs, Agricultural and Food Trade, and Competitiveness, *Special Issue: NTMs, Agricultural and Food Trade, and Competitiveness,* v.35(8), pp 967–972, August.

Richard Baldwin, 2010, "***Unilateral tariff liberalisation***", Graduate Institute, Geneva, November. http://www.econ.hit-u.ac.jp/~cces/COE2010_HP_20101006/paper/richard_baldwin.pdf.

Sathe Dhanmanjiri and Deshpande, (2006), "***Sustaining Agricultural Trade Policy and Impact***", Economic and Political Weekly, Vol. 41 (52), (Dec. 30, 2006 - Jan. 5, 2007), pp. 5337-5344.

UNCTAD, 2005, "***Methodologies, Classifications, Quantification and Development Impacts of Non-Tariff Barriers***", A Note by the UNCTAD secretariat, TRADE AND DEVELOPMENT BOARD, Commission on Trade in Goods and Services, and Commodities Expert Meeting Geneva, September.

UNCTAD, 2012, "***Classification of Non-Tariff Measures***", https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=299.

William Schneider Jr, 1975, *"**Agricultural Exports as an Instrument of Diplomacy**"*, Food Policy, v. 1(1), 1975, pp 23-31, November.

Yuhua Zhang, 2014, *"Integrating SMEs into Global Value Chains: Policy Principles and Best Practices"*, Issues Paper No.6, APEC Policy Support Unit, APEC, May.

WTO Documents

WTO, (2008), Note by the Secretariat of the Committee on Sanitary and Phytosanitary Measures, Workshop on Transparency held on 15-16 October 2007, G/SPS/R/47, 8 January 2008.

WTO, 2007, "Compilation of Proposals Regarding the Revision of the "Recommended Procedures for Implementing the Transparency Obligations of the SPS Agreement (ARTICLE 7)", Committee on Sanitary and Phytosanitary Measures, G/SPS/W/215, 8 October 2007.

WTO, 2008, Draft texts of December 2008, 'NAMA modalities' and 'Revised draft modalities for NAMA, https://www.wto.org/english/tratop_e/markacc_e/guide_dec08_e.htm; Agriculture text - https://www.wto.org/english/Tratop_e/agric_e/chair_texts08_e.htm.

WTO, https://www.wto.org/english/thewto_e/minist_e/min01_e/brief_e/brief05_e.htm.

WTO, See https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm3_e.htm

Web Portal of Centre for WTO Studies

SPS measures < http://cc.iift.ac.in/sps/index.asp>.
TBT measures < http://cc.iift.ac.in/tbt/index.asp>.

Country Legislations

Australia, http://www.foodstandards.gov.au/about/foodenforcementcontacts/pages/daff.aspx

Australia, http://www.foodstandards.gov.au/about/safefoodsystem/Pages/default.aspx

Canada,http://www.inspection.gc.ca/about-the-cfia/accountability/compliance-and-enforcement/refused-entry/eng/1324305448701/1324305531127.

EU, See for details, https://ec.europa.eu/food/safety/rasff/portal_en

EU, See http://trade.ec.europa.eu/doclib/docs/2013/april/tradoc_150986.pdf

EU, See http://trade.ec.europa.eu/doclib/docs/2013/april/tradoc_150986.pdf

Malaysia, Food Regulations 1985 (gazetted on 26 September 1985) of the Food Act 1983 (enacted as Laws of Malaysia Act 281; gazetted on 10 March 1983). < http://fsq.moh.gov.my/v5/ms/food-regulations-1985-2/>

Japan, 2011, "Ensuring drug and food safety", Ministry of Health, Labour and Welfare, http://www.mhlw.go.jp/english/policy/health-medical/food/dl/pharmaceutical_and_food_safety_bureau.pdf

Japan, 2011, "Specifications and Standards for Foods, Food Additives, etc., Under the Food Sanitation Act 2010", Japanese External Trade Organisation (JETRO), April, https://www.jetro.go.jp/ext_images/en/reports/regulations/pdf/foodext2010e.pdf.

US, Grains Report, 2011, Brazil Food and Agricultural Import Regulations and Standards – Narrative, FAIRS Country Report, https://gain.fas.usda.gov/Recent%20GAIN%20Publications/

US, Grains Report, 2015, Chile Food and Agricultural Import Regulations and Standards – Narrative, FAIRS Country Report, https://gain.fas.usda.gov/Recent%20GAIN%20Publications/

Annexures

Annexure 1: Part A.1 Suggested Modifications for Improved Transparency in Agricultural Products (WTO Tariff Profile)

Part A.1		Tariffs and imports: Summary and duty ranges								
Summary			Total	Ag	Non-Ag	WTO member since				1995
Simple average final bound			4.8	10.9	3.9	Binding coverage:			Total	100
Simple average MFN applied		2015	5.1	10.7	4.2	Non-Ag				100
Count of NAV Lines		**2015**	***	***	***	**Non Ad Valorem**				**?%**
Trade weighted average,		2014	2.7	8.5	2.3	Ag: Tariff quotas (in %)				11.3
Imports in billion US$,		2014	1,929.6	131.2	1,798.4	Ag: Special safeguards (in %)				23.9
Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
		Tariff lines and import values (in %)								in %
Agricultural products										
Final bound		32.3	11.0	17.1	14.4	11.1	9.4	2.3	0.4	32.0
MFN applied	2015	31.7	11.2	17.8	14.1	10.6	8.4	2.4	0.3	32.2
Imports Total	2014	46.7	11.0	16.9	10.2	4.8	7.7	2.5	0.1	18.9
Imports under NAV	**2015**									
Imports under AV	**2015**									
Non-agricultural products										
Final bound		28.4	37.2	26.6	6.9	0.9	0.0	0	0	0.6
MFN applied	2015	26.5	37.5	27.1	7.3	1.5	0.1	0	0	0.6
Imports	2014	63.1	20.0	10.0	5.9	1.0	0.0	0	0	0.5

Source: Adopted from the one-page tariff profile WTO by the author.

Annexure 2: List of Agricultural Products without MRLs on AIs: Japan

Agricultural Products	Agricultural Products
Alfalfa	Native currant
Azarole	Nut, almond, hulls
Buffaloberry	Nut, butter
Burdock, edible, root	Nut, candle
Catjang	Nut, pachira
Che	Nut, pili
Cherry, black	Onion, tree, tops
Cherry, capulin	Orach
Cherry, Nanking	Orange, tachibana
Chervil, turnip, root	Orange, trifoliate
Chilean guava	Partridgeberry
Chironja	Pea, blackeyed
Chokecherry	Pea, crowder
Chrysanthemum, edible-leaved	Pea, southern
Crabapple	Pepper leaf
Cranberry, highbush	Peppermint
Currant, buffalo	Persimmon, American
European barberry	Phalsa
Garlic, great headed, bulb	Plantain
Gherkin, West Indian	Plum, beach
Jostaberry	Plum, Klamath
Kurrat	Pulasan
Lime, Australian desert	Radicchio (red chicory)
Lime, Australian finger	Raspberry, wild
Lime, Australian round	Riberry
Lime, Brown River finger	Salsify, black, root
Lime, Mount White	Salsify, root

Lime, New Guinea wild	Salsify, Spanish, root
Lime, Russell river	Schisandra berry
Lime, sweet	Serviceberry
Mandarin, Mediterranean	Shallot, fresh leaves
Mayhaw	Spearmint
Medlar	Tangor
Melon, mango	Tejocote
Melon, snake	Ugli / Uniq fruit
Millet, pearl, grain	Youngberry
Muntries	

Source: Based on Global MRL Database extracted on 11-08-2015.

Annexure 3: Stringent Active Ingredients/Substances in 33 Agricultural Products: Developed Vs Developing Countries.

S.N.	Active Ingredients/Substances	Developed		Developing	
		Average of Stringent MRLs	Presence in No. Countries	Average of Stringent MRLs	Presence in No. Countries
1	Zeta-Cypermethrin	9	5	3	4
2	Azoxystrobin	8	4	6	2
3	Sulfoxaflor	7	3	0	0
4	Alpha-Cypermethrin	7	4	3	4
5	Thiamethoxam	7	4	5	2
6	Boscalid	7	4	5	1
7	Lambda Cyhalothrin	7	5	5	1
8	Pyraclostrobin	6	4	3	2
9	Spinosad	6	5	2	2
10	Piperonyl Butoxide	6	4	0	0
11	Gamma Cyhalothrin	5	3	1	1
12	Chlorantraniliprole	5	4	4	2
13	Imidacloprid	5	4	3	2
14	Glyphosate	5	5	3	2
15	Fludioxonil	4	5	3	2
16	Diflubenzuron	4	3	2	1
17	Paraquat dichloride	4	3	2	2
18	Carbaryl	4	2	1	1
19	Deltamethrin	4	5	4	3
20	Flubendiamide	4	5	4	2
21	Clothianidin	4	4	3	2
22	Tebuconazole	4	4	3	3
23	Bifenthrin	4	4	3	2
24	MCPA	3	3	1	1
25	Prothioconazole	3	4	3	2
26	Clethodim	3	3	1	2
27	Dicamba	3	2	0	0
28	Dimethoate	3	1	0	0
29	Fluopyram	3	4	0	0
30	Fluxapyroxad	3	4	2	1
31	Indoxacarb	3	3	3	1
32	Methomyl	3	3	1	1
33	Penthiopyrad	3	4	0	0
34	Trifloxystrobin	3	5	2	1
35	Ethephon	3	3	1	2
36	Chlorothalonil	3	5	1	3
37	Methoxyfenozide	3	5	3	1
38	Cyromazine	3	4	1	1

S.N.	Active Ingredients/Substances	Developed		Developing	
		Average of Stringent MRLs	Presence in No. Countries	Average of Stringent MRLs	Presence in No. Countries
39	Dinotefuran	3	2	0	0
40	Fipronil	3	4	0	0
41	Metalaxyl	3	2	0	0
42	Metalaxyl-M (Mefenoxam)	3	2	4	1
43	Spirotetramat	3	4	5	1
44	Chlorpyrifos	2	5	4	2
45	Difenoconazole	2	5	4	2
46	Fenpropathrin	2	3	2	1
47	Phosmet	2	3	1	1
48	Malathion	2	4	2	2
49	Diquat dibromide	2	5	1	2
50	Acephate	2	1	0	0
51	Aminopyralid	2	4	0	0
52	Buprofezin	2	3	2	1
53	Clofentezine	2	5	0	0
54	Cyantraniliprole	2	4	2	1
55	Fenbutatin-oxide	2	1	0	0
56	Imazapic-ammonium	2	2	0	0
57	Mandipropamid	2	2	0	0
58	Oxamyl	2	1	0	0
59	Oxydemeton-methyl	2	4	0	0
60	Permethrin	2	5	2	1
61	Saflufenacil	2	4	1	1
62	Sulfuryl fluoride	2	2	0	0
63	Thiacloprid	2	5	0	0
64	Triadimenol	2	3	1	1
65	Trinexapac-ethyl	2	3	3	1
66	Zinc phosphide	2	1	0	0
67	Fenamidone	2	4	2	1
68	Tebufenozide	2	4	1	2
69	Acetamiprid	2	3	4	1
70	Fenarimol	2	2	1	1
71	Fenhexamid	2	4	0	0
72	Flutriafol	2	2	2	1
73	Glufosinate-ammonium	2	4	2	3
74	Propargite	2	2	0	0
75	Quinoxyfen	2	2	0	0
76	Thiophanate-methyl	2	2	1	1
77	Bifenazate	1	5	0	0
78	2,4-D	1	3	2	3
79	Abamectin	1	3	0	0
80	Cyproconazole	1	3	2	1
81	Emamectin	1	3	1	1
82	Endosulfan	1	3	0	0
83	Fenpyroximate	1	3	3	1
84	Inorganic bromide resulting from fumigation with methyl bromide	1	3	4	1
85	Mancozeb	1	3	4	2
86	Myclobutanil	1	3	1	2
87	Thiabendazole	1	3	1	1
88	Beta-cyfluthrin	1	4	0	0
89	Chlorpyrifos-methyl	1	4	1	1
90	Cyfluthrin	1	4	1	1

S.N.	Active Ingredients/Substances	Developed		Developing	
		Average of Stringent MRLs	Presence in No. Countries	Average of Stringent MRLs	Presence in No. Countries
91	Metrafenone	1	4	0	0
92	Novaluron	1	4	3	2
93	Zoxamide	1	4	1	1
94	Captan	1	5	1	2
95	Cyprodinil	1	5	2	2
96	Aldicarb	1	3	1	2
97	Ametoctradin	1	2	0	0
98	Amitraz	1	1	0	0
99	Carbon disulfide	1	1	0	0
100	Chlorpropham	1	2	1	3
101	Cypermethrin	1	4	2	2
102	Diazinon	1	1	0	0
103	Dichlobenil	1	1	0	0
10N	Dicloran	1	1	0	0
105	Dicofol	1	3	1	2
106	Dimethomorph	1	2	3	4
107	Diphenylamine	1	1	0	0
108	Etofenprox	1	1	0	0
109	Etoxazole	1	2	0	0
110	Fenbuconazole	1	1	1	1
111	Ferbam	1	1	0	0
112	Fluopicolide	1	1	4	1
113	Flutolanil	1	2	1	2
114	Hexythiazox	1	2	0	0
115	Iprodione	1	2	1	1
116	Mesotrione	1	1	0	0
117	Pentachloronitrobenzene	1	2	0	0
118	Pirimiphos-methyl	1	2	1	3
119	Propamocarb hydrochloride	1	2	1	2
120	Propiconazole	1	2	2	1
121	Pyrimethanil	1	3	0	0
122	Spinetoram	1	1	0	0
123	Terbufos	1	1	0	0
124	Tolfenpyrad	1	1	0	0
125	Triflumizole	1	5	2	1
126	Ziram	1	1	0	0
127	Famoxadone		0	1	1
128	Isoxaflutole		0	1	1
129	Kresoxim-methyl		0	1	1
Grand Total		208		**77**	

Source: Based on Global MRL Database extracted on 11-08-2015.

Annexure 4: Additional MRLs Standards over and above the Codex list of AIs (Non-Codex Standards)

Agricultural products#	Australia	Canada	European Union	Japan	United States	Mexico*	Brazil	Chile	India	Malaysia	Grand Total
Barley, grain	17	16	4	8	15	15	8		3		86
Beet, sugar, root	4	8	4	2	10	10		10			48
Cattle, meat	38	25	26	34	44	44		10	5	3	229
Chickpea	4	4	6	3	9	9			1		36
Coconut	3			1	2	2					8
Coffee bean, green			2	1	2	2	2				9
Corn, grain	10	8	7	6	8	8	14		4	3	68
Cucumber	7	12	16	2	14	14	21	8		3	97
Cumin, seed					1	1					2
Eggs, chicken	9	4	7	3	9	9		3			44
Garlic, bulb	4	4			5	5	6	2			26
Grape, table	13	22	15	3	21	21	21	7	4	1	128
Guar	5	4	2	5	8	8				2	34
Lentil	6	5	4	3	8	8		4	1		39
Mango	2	1		2			4	2			11
Milk	26	15	10	15	16	16		9	5	1	113
Mustard seed (oilseed)	2	2	1		1	1					7
Nut, cashew	4	3	6	2	6	6					27
Nut, walnut, English (Persian)	4	5	7	4	7	7		5			39
Onion, bulb	10	10	5	3	7	7	13	3	1	1	60
Peanut	7	8	3	5	11	11	4			1	50
Pepper, non-bell	12	11	21	9	14	14	7	15	2	6	111
Rice	9	5	6	12	10	10	9	4	3	4	72
Sesame, seed	2	1	1								4
Soybean	10	10	13	5	18	18	22	1	3		100
Spearmint	2	2			6	6					16
Sugar cane	6		2		2	2	6				18
Tea, leaves	1		1	2					1	1	6
Turmeric, root	2	2			6	6					16
Wheat, grain	22	12	10	9	20	20	15	1	11		120
Grand Total	**241**	**199**	**179**	**139**	**280**	**280**	**152**	**84**	**44**	**26**	**1624**

Note: * =Identical with US MRL Standards on active ingredients. # = three products have been deleted for calculation these are Cardamom, Pepper-Spice and Saffron.
Source: Based on Global MRL Database extracted on 11-08-2015.

Annexure 5: No of Stringent Active ingredients to Total Active Ingredients (% share)

Product	Australia	Brazil	Canada	Chile	EU	India	Japan	Malaysia	Mexico	United States
Barley, grain	25.0	18.6	27.6	0.0	5.1	7.9	11.0	0.0	17.0	17.0
Beet, sugar, root	16.0	0.0	22.9	21.7	5.8	0.0	3.1	0.0	13.2	13.2
Cardamom	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cattle, meat	31.9	0.0	31.6	10.8	20.2	6.0	24.8	3.5	27.5	27.5
Chickpea	6.7	0.0	8.7	0.0	5.7	3.1	2.8	0.0	7.7	7.7
Coconut	33.3	0.0	0.0	0.0	0.0	0.0	7.7	0.0	10.5	10.5
Coffee bean, green	0.0	13.3	0.0	0.0	10.5	0.0	7.7	0.0	10.5	10.5
Corn, grain	12.7	16.5	9.4	0.0	6.2	7.8	5.4	5.6	5.7	5.7
Cucumber	12.1	32.3	16.7	9.9	15.8	0.0	2.1	4.7	12.7	12.7
Cumin, seed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	6.7
Eggs, chicken	15.3	0.0	10.3	5.4	9.1	0.0	4.1	0.0	9.9	9.9
Garlic, bulb	11.1	22.2	11.8	4.3	0.0	0.0	0.0	0.0	6.0	6.0
Grape, table	13.4	26.6	27.8	8.2	13.5	5.4	2.8	1.4	17.1	17.1
Guar	17.9	0.0	14.3	0.0	4.3	0.0	10.9	14.3	14.8	14.8
Lentil	12.0	0.0	11.6	8.5	5.4	3.4	4.0	0.0	9.6	9.6
Mango	8.7	22.2	5.9	6.5	0.0	0.0	5.7	0.0	0.0	0.0
Milk	21.7	0.0	18.8	9.1	7.6	5.6	10.9	1.1	10.0	10.0
Mustard seed (oilseed)	22.2	0.0	8.3	0.0	3.2	0.0	0.0	0.0	2.7	2.7
Nut, cashew	15.4	0.0	8.3	0.0	7.8	0.0	2.9	0.0	6.8	6.8
Nut, walnut, English (Persian)	11.8	0.0	11.4	7.6	7.4	0.0	4.6	0.0	6.5	6.5
Onion, bulb	25.0	23.6	18.5	5.8	6.7	2.4	4.4	2.4	8.5	8.5
Peanut	17.9	8.7	23.5	0.0	3.4	0.0	5.9	2.5	11.2	11.2
Pepper (spice)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pepper, non-bell	23.5	13.5	15.9	18.5	19.6	3.5	8.3	9.8	11.7	11.7
Rice	20.0	18.0	20.8	10.3	10.3	8.3	23.1	9.8	14.5	14.5
Saffron	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sesame, seed	20.0	0.0	6.7	0.0	3.6	0.0	0.0	0.0	0.0	0.0
Soybean	16.7	22.2	13.5	2.0	11.9	5.5	4.6	0.0	14.1	14.1
Spearmint	11.8	0.0	15.4	0.0	0.0	0.0	0.0	0.0	11.3	11.3
Sugar cane	24.0	17.1	0.0	0.0	4.9	0.0	0.0	0.0	4.1	4.1
Tea, leaves	20.0	0.0	0.0	0.0	10.0	20.0	18.2	20.0	0.0	0.0
Turmeric, root	9.5	0.0	5.9	0.0	0.0	0.0	0.0	0.0	8.7	8.7
Wheat, grain	25.3	21.1	16.4	1.7	10.0	18.3	9.2	0.0	17.2	17.2

Note: Stringency in each product is calculated by taking the count of Active Ingredients (AIs), which above the Codex to the total AIs in the product.
Source: Authors Calculation based on Global MRL Database extracted on 11-08-2015

.

Authors

Dr Murali Kallummal

Professor at the Centre for WTO Studies, he is associated with the Centre since 2003. He specialises on market access issues both under the WTO and Regional Trade Agreements and has extensively worked on tariffs and non-tariff measures (NTMs). He has published papers in peer-reviewed journals and has been a reviewer for several international and Indian journals. He has also been consulted by several international bodies/agencies for conducting training programmes. His pioneering work has been conceiving and executing India's first web-based portal on SPS and TBT measures. The database provides trade link for all the WTO notified measures on SPS and TBT since 1995. Email: muralik@iift.edu

‘

Ms Hari Maya Gurung

Research Fellow (Economics) at the Centre for WTO Studies since 2007. She holds two Post Graduate degrees in English and Economics from Anna Malai University after graduating from Delhi University. She has presented several papers at national level conferences and published papers. At the Centre, she is working on FTAs, trade links for SPS and TBT measures, CWS databases and Standard-related work. Email: harimaya@iift.edu

ABOUT THE CENTRE

The Centre for WTO Studies was set up in the year 1999 to be a permanent repository of WTO negotiations-related knowledge and documentation. Over the years, the Centre has conducted a robust research programme with a series of papers in all spheres of interest at the WTO. It has been regularly called upon by the Government of India to undertake research and provide independent analytical inputs to help it develop positions in its various trade negotiations, both at the WTO and other forums such as Free and Preferential Trade Agreements and Comprehensive Economic Cooperation Agreements. Additionally, the Centre has been actively interfacing with industry and Government units as well as other stakeholders through its Outreach and Capacity Building programmes by organising seminars, workshops, subject-specific meetings etc. The Centre thus also acts as a platform for consensus-building between stakeholders and policymakers.

Centre for WTO Studies,
5th to 8th Floor, NAFED House, Siddhartha Enclave, Ashram Chowk,
Ring Road, New Delhi – 110014
Phone Nos: 91- 011- 38325622, 38325624
http://wtocentre.iift.ac.in/
Follow us here: Facebook: facebook.com/CentreForWtoStudies
LinkedIn: linkedin.com/company/cwsiift
Twitter: twitter.com/CWS_iift