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Analysis of Indian and Canadian Laws on Biofertilizers***

Abstract

Biofertilizers are known to be effective green alternatives to chemical fertilizers. Biofertilizers are regulated under the Fertilizer (Control) Order, 1985 in India and the Fertilizers Regulations (C.R.C., c. 666) of the Fertilizers Act, 1985 in Canada. The laws in both countries originally evolved to regulate chemical fertilizers; however, appropriate amendments have been made to accommodate biofertilizers and organic fertilizers in India, and organic fertilizers in Canada. Yet there have been no critical analyses of the laws and regulations governing the manufacture, business, transport, storage, use and disposal of biofertilizers in India and Canada. This article seeks to understand the different legal provisions of the Indian and Canadian laws regulating biofertilizers. The legal analysis is based on dialectical, qualitative and comparative legal research, as well as gap analysis. This study not only identifies the legal gaps existing in the Indian and Canadian frameworks, but also suggests ways forward to avoid bottlenecks impeding the entry into the market and free trade of biofertilizers.
Keywords: biofertilizers, microbial products, legal analysis, gap analysis, legal reform.

1. Introduction

The unsustainable application of chemical fertilizers has resulted in the steady decline of soil and crop productivity the world over. Agricultural practices must evolve to sustainably meet the growing global demand for food without irreversibly damaging the world's natural resources (especially soil), while also maintaining food security.[1] Green microbial products, such as biofertilizers, hold the potential to increase current agricultural productivity, while at the same time contributing to the soil's ability to produce more.[2] This study is the first critical analysis of the laws and regulations governing the use of biofertilizers in India and Canada.

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[1] Arjjumend, Koutouki & Neufeld 2021.

[2] Arjjumend, Koutouki & Donets 2020a & 2020b.

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Many countries face major challenges with respect to the regulation of biofertilizers, including inadequate legislation, inadequate capacity, and the weak implementation of policies related to biofertilizers.[3] A number of countries have amended their policies to minimize the use of chemical fertilizers and promote the use of biofertilizers; however, biofertilizers are still largely regulated by the system originally designed for chemical fertilizers.[4] This situation has created market entry barriers by imposing burdensome costs on the biofertilizer industry.[5] Other challenges include the relative immaturity of the policy network, limited resources and capabilities, and a lack of trust between regulators and producers. In India, manufacturers and importers of biofertilizers also face additional problems. For example, at the time of registration of new products, the manufacturer/trader/importer is required to generate data that are easily obtainable for chemical-based products, but which are difficult to obtain for biofertilizers.[6] Furthermore, there are questions as to the utility of some of this data when applied to biofertilizers. The analysis in this study finds that the Indian law on fertilizers is one of the most comprehensive in the world in terms of its treatment of biofertilizers. However, challenges lie at the level of the technical or administrative personnel who deal with the registration, testing, monitoring, surveillance, inspection and authorization tasks. Their level of understanding and their capacities are limited to chemical synthetics, and they have little or no experience with biofertilizers. Therefore, compliance and implementation of the regulations are major challenges in India.

2. Context and Methodology

This study was conducted in order to understand the various legal provisions in Indian and Canadian laws regulating biofertilizers. It aims not only to identify the policy and legal gaps existing in the Indian and Canadian frameworks governing biofertilizers, but also to suggest ways forward in order to avoid bottlenecks impeding the entry and free trade of green products that can contribute to the achievement of the sustainable development goals (SDGs). This study was conducted through an analysis of the pertinent clauses and sections of laws regulating fertilizers. Research methods included dialectical, qualitative and comparative legal research,[7] as well as gap analysis.

3. Analysis of the Indian Law on Biofertilizers

After independence, the Government of India declared fertilizers an essential commodity, and began regulating the sale, price and quality of fertilizers.

[3] Urs 2015.
[4] Arjjumend et al. 2020.
[5] Kumar & Singh 2014.
[6] Arjjumend & Koutouki 2020.
[7] Dialectical research or dialectical inquiry or dialectical investigation is a form of qualitative research which utilizes the method of dialectic, aiming to discover fact through examining and interrogating competing ideas, perspectives or arguments. Dialectical research may also be thought of as the opposite of empirical research, in that the researcher is working with arguments and ideas, rather than data. Ollman 1993.

In 1985, the Government of India passed the Fertilizer (Control) Order, 1985 [FCO] under Section 3 of the Essential Commodities Act, 1955. This law applies in all states and union territories of India. The Indian Ministry of Agriculture issued an order in 2006, later amended in 2009, which added biofertilizers to the Essential Commodities Act, 1955.

As a result, India now has one of the world's most comprehensive legal frameworks governing biofertilizers, defined in the FCO as follows: Biofertilizer means the product containing carrier based (solid or liquid) living microorganisms which are agriculturally useful in terms of nitrogen fixation, phosphorus solubilization or nutrient mobilization, to increase the productivity of the soil and/or crop.[8]

Coinciding with the insertion in the FCO of the term biofertilizer, new schedules – Schedule III, IV and V – were also added. Schedule III relates to mixtures of biofertilizers, whereas Schedule IV concerns organic fertilizers. Similarly, Schedule V was added in 2010 to address non-edible de-oiled cake fertilizers,[9] which are obtained through residue oil extraction (by expeller and/or through solvent extraction) from the crushed seeds of non-edible oilseeds (such as castor oil) for use in soil as fertilizer. Schedules III, IV and V also introduced standards to maintain the quality of biofertilizers. In this way, a conventional law dealing with chemical fertilizers was amended to address microbial and organic products developed through novel innovations.

3.1. Registration of Dealers

Schedule IV of the FCO contains provisions for the registration of dealers. Under clauses 7, 8, 9 and 10 of the FCO, a dealer (a firm, company or organization) can register with the state government (generally the Department of Agriculture) to sell, trade, transport, store or transfer fertilizer, including biofertilizer. The registration of dealers or manufacturers/importers is a decentralized process conducted by respective state government only; the Government of India does not perform any registration functions. A firm or company that wishes to obtain dealership registration must apply using Form A (Appendix 1), along with Form O (Appendix 2) under clause 8 of the FCO. In order to understand the registration process, it is important to discuss these forms. In Form A, serial number 7 and 8 require the details of the fertilizer (or biofertilizer) to be handled by the applicant dealer. In particular, information is required about the site and process of manufacturing is required. This information is also required in further detail in Form O. The rest of the information in Form A pertains to general details about the applicant firm and the promoter of the firm.

[8] Ins. by SO 391(E), Agriculture and Cooperation Department, dated 24.03.2006 published in Gazette of India, Ext. No. 276.
[9] Ins. by SO 2886(E), dated 03.12.2010.

In Form O, information regarding the product source must be provided in items number 1(c) & (d) and 3. All such details must also be supported by documentary evidence. Clause 8(2) of the FCO provides for the registration by a manufacturer, importer, pool handling agency[10], wholesaler or retail dealer, and replaces Form A (Appendix 1) with Form A1, which is slightly different.

Clause 8(4) was added in 2015 to establish the minimum technical qualification required for the applicant/promoter of firm/company applying for registration.[11] The applicant should possess, at a minimum, a BSc in Agriculture, BSc in Chemistry, Diploma in Agriculture, or a Certificate in Agri-inputs from specified institutes. Cooperatives and marketing federations are exempted from this requirement. Registration is granted for 36 months as per clause 10 of the FCO and may be renewed as provided in clause 11.

3.2. Registration of Manufacturing of Mixtures of Biofertilizers

In part IV of the FCO, clauses 12 to 18 provide for the registration of manufacturing units. Special mixtures of fertilizers, biofertilizers and organic fertilizers were included in clause 12 in 2006.[12] Clause 13(b) states, *"no person shall manufacture any biofertilizer unless such biofertilizer conforms to the standards set out in Part A of Schedule III."* In different schedules, the FCO has very elaborately provided standards for all categories of mineral fertilizers, biofertilizers and organic fertilizers. Part A of Schedule III contains specifications for all 10 categories of biofertilizers: Rhizobium, Azotobacter, Azospirillum, Phosphate Solubilizing Bacteria, Micorrhizal Biofertilizers, Potassium Mobilizing Biofertilizers, Zinc Solubilizing Biofertilizers, Acetobacter, Carrier Based Consortia, and Liquid Consortia. Part B of Schedule III specifies the tolerance limit of biofertilizers, while Part C explains the procedure of sampling biofertilizers. Part D comprehensively elaborates the methods of analyzing biofertilizers. The detail and guidance given in the schedules of the FCO make it user friendly. Hence, as clause 13(b) advises, compliance with its stringent quality standards and specifications is mandatory. No manufacturing or import can be allowed until given specifications and standards are satisfied in accordance with the provisions. Similarly, the requisite standards and specifications need to be adhered to in the case for organic fertilizers [clause 13(c) and Part A of Schedule IV]. Any firm or company that wishes to apply for registration as a manufacturer of biofertilizers or organic fertilizers must apply using Form D under clause 14(3). In accordance with clause 17 of the FCO, registration for manufacturing is issued for a period of 36 months, and renewal can be applied for under clause 18.

[10] Pool handling agency means an agency entrusted by the Government of India with functions relating to handling and distribution of imported fertilizers.
[11] Ins. by SO 2776(E), dated 10.01.2015.
[12] Subs. for by SO 391(E), dated 24.03.2006.

3.3. Packing and Labeling

Under clause 21(aa) of the FCO, manufacturers, importers and pool handling agencies are given explicit instructions regarding packing and packaging. The container should be marked with the word 'biofertilizer'. Other information printed on the packaging or container must be in accordance with the instructions released by the Controller (the registering authority in each state). Further, clause 21(b) prohibits tampering with packed or canned material. This clause is also applicable to imported material. However, the regulation does not address the issue of leakage and spillage from the containers, cans or packages causing contamination, pollution, impacts of human and animal health or occupational hazards.

3.4. Inspectors and Inspection

The quality and quantity of commodities available on the market for consumers are monitored and inspected by a system of inspectors. In the context of fertilizers, these inspectors are appointed by notified authorities under clause 27 of the FCO. Clause 27-B concerns the qualifications[13] of inspectors appointed for the purpose of monitoring biofertilizers and organic fertilizers. Inspectors should have bachelor's degree in agriculture, chemistry or microbiology, with training in the quality control of biofertilizers and organic fertilizers. Their responsibilities include the verification of information provided by manufacturers, wholesale dealers, retail dealers, importers or pool handling agencies (clause 28a), as well as the sampling of biofertilizers (clause 28ba) in accordance with the procedure laid down in Schedule III of the FCO. In accordance with the powers vested under clauses 28c, 28d and 28e, an inspector can inspect and examine the premises of manufacture, sale or storage of the fertilizer or biofertilizer in addition to examining the financial accounts or documents associated with the material. An inspector can also seize or detain any fertilizer or biofertilizer. The inspection machinery having inspectors is an inevitable apparatus of the regulatory and executive wing of a state government.

3.5. Sampling and Analysis of Biofertilizers

In Part C of Schedule III of the FCO, the procedure for biofertilizer sampling is described in detail. Part C covers: 1) the general requirements of sampling, 2) the scale of sampling, and 3) the procedure for taking samples. Only a trained inspector can perform sampling of the biofertilizer, as the material contains microorganisms. During the handling of the samples, precautions must be taken to prevent any possible contamination and exposure to sun, dust, soot, air or moisture. In Schedule III, the quantity of samples is also simplified. Using the Form J-1, three packets must be sampled from a consignment of up to 5,000 packets. Similarly, four packets must be sampled if the consignment is of 5,001-10,000 packets, and five packets must be sampled in case the consignment consists of more than 10,000 packets.

[13] ffranciIns. by SO 391(E), dated 24.03.2006.

The sampling method must be strictly random and instructions for the proper handling of the samples are described. One sample is to be sent to a laboratory notified by the state government under clause 29 of the FCO, to the National Centre for Organic Farming (Ghaziabad), or to any of its Regional Centres of Organic Farming at Bangalore, Bhubaneswar, Hissar, Imphal, Jabalpur or Nagpur. The inspector must send the sample to a laboratory along with the details outlined in Form K1 within seven days from the date the samples are drawn. The FCO regulations not only guide the manner in which notified authorities and inspectors implement the legal provisions, but also provide the manufacturers, wholesale dealers, importers, pooling agents and retail dealers with all necessary forms, reporting requirements, and technical specifications.

The samples of biofertilizers received by the notified laboratory must be analyzed and tested in strict adherence to the norms given in clause 29(1-A). For each of the ten categories of biofertilizers, an elaborate method and procedure is set forth in Part D of Schedule III of the FCO. These procedures conform to the technical specifications for biofertilizers as described in Part A of Schedule III of the FCO. For example, for analyzing the Phosphate Solubilizing Bacterial (PSB) biofertilizer, a testing laboratory must have to follow these major segments: (1) Apparatus, which a testing laboratory must have before analysis, (2) Reagents required for creating medium and sterilization of plates etc., (3) Preparation of serial dilutions for plate counts, (4) Incubation of plates, (5) Determination of soluble phosphorus using ascorbic acid, (6) Estimation of total viable propagules, (7) Estimation of infectivity potential, (8) Maintenance and preparation of culture and quality control at broth stage. After sample analysis, the laboratory must send the test report to the notified authority within 30 days from the date of receipt of the sample. This sample analysis report is completed in Form L2.

3.6. Quality Control

Quality control issues pertaining to biofertilizers have received special focus in the stringent standards and specifications set in the FCO. Having stringent high standards checks the crop failure and crop loss that occurs due to the ineffectiveness of biofertilizers, in order to avoid the economic and agronomic costs to farmers. The FCO's Schedule III includes standards and specifications for all ten categories of biofertilizers identified and recommended by the Advisory Committee, which functions according to the provisions of clause 38 of the FCO. These standards set out seven quality parameters for biofertilizer samples: the physical form, the minimum count of viable cells, the contamination level, pH, the particle size in case of carrier-based materials, the maximum moisture percent by weight of carrier-based products, and the efficiency character. For example, in the case of bacteria, the minimum count of viable cells is 5×10^7 cells per gram of solid carrier, or 1×10^8 cells per ml of liquid carrier (Part A of Schedule III of the FCO). For products containing mycorrhizal fungi, at least 100 viable propagules must be present per gram of finished product. In addition, the efficiency of nitrogen fixation must be shown with different tests:

Rhizobia shall show effective nodulation, Azotobacter strains shall be capable of fixing at least 10 mg N per g of sucrose consumed, and Azospirillum strains must be able to form a white pellicle in semisolid N-free bromothymol blue media.[14] The activity of phosphate solubilizing bacteria (PSB) can be assessed spectrophotometrically (30% P solubilization) or by the formation of a solubilization zone of at least 5 mm in a media having at least 3 mm thickness.[15] Similarly, products with mycorrhizal fungi shall be able to provide 80 infection points in roots per gram of inoculum used (Malusá and Vassilev, 2014). Sample analysis in laboratories is described in Part D of Schedule III of the FCO.

3.7. Ecological and Health Safety Issues

Having been amended in 2006 and 2009 to insert provisions for biofertilizers and organic fertilizers, the FCO is the most progressive regulation in the world concerning fertilizers. Yet while the FCO has addressed quality control issues indirectly in several ways (as described in the preceding subheading), other quality-related aspects, ecological risks, human and animal health safety, spillage, contamination, and occupational hazards are not considered anywhere in the regulation. Though the chemical fertilizers have higher risks to ecosystems, human and animal health, occupational safety, microbial biofertilizers may also pose risks to the ecosystems and human health if not handled carefully. Amended legislation, i.e., the FCO, does not have direct instructions to regulate ecological hazards and health safety issues that may emanate from biofertilizers. By contrast, the Canadian regulation has addressed these issues in a comprehensive manner.

4. Canadian Regulation on Biofertilizers and Comparison with Indian Law

4.1. Background

Under the Fertilizers Act, 1985, regulations governing fertilizers (the Fertilizers Regulations – C.R.C., c. 666) were consolidated and most recently amended on February 27, 2015 and on October 26, 2020.[16] Under section 11 of the regulations, manures are exempt from classification as fertilizers provided they do not harm plants or animals in any manner. As per the provisions of section 11, raw materials like rock phosphate and supplements for experimental use are also exempt. However, the Canadian regulations are silent with respect to emerging technological products such as biofertilizers, organic fertilizers and non-edible de-oiled cake fertilizers, which are recognized explicitly in India's law. In Canadian regulations, there is no explanation or illustration about biofertilizers in these regulations. In Schedule II, fertilizers are divided into Class 1 (nitrogen products) consisting of mineral-based chemicals (clause 1.1-1.10, 1.12), biologically dead and sewage wastes (clauses 1.11, 1.13, 1.15, 1.17, 1.19-1.20), organic waste (clauses 1.14, 1.16), compost (clause 1.18), synthetic derivatives (clauses

[14] Malusá & Vassilev 2014.
[15] Malusá & Vassilev 2014.
[16] Consolidation Fertilizers Regulations.

1.21-1.28, 1.30-1.32), and soybean cakes (clause 1.29). Class 2 (phosphorus products) of Schedule II consists of by-products of chemical reactions (clauses 2.1-2.4, 2.6, 2.8), biological dead wastes (clauses 2.5, 2.9-2.10), and mineral-based chemicals (clause 2.7). Class 3 (potassium products) consists of chemicals only (clauses 3.1-3.6). Class 4 (calcium and magnesium products) also consists entirely of chemicals (clauses 4.1-4.2). Class 5 (supplements) consists of chemicals (clauses 5.1-5.4), in addition to peat matter (clause 5.5).

It is notable that the biofertilizers have been excluded from all five classes listed in the Canadian regulations. This exclusion can be understood, given that when the Fertilizers Act, 1985 was drafted the science of biofertilizers was nascent. At that time, it might have been difficult to imagine the scientific, technological, production, trade and application implications of biofertilizers. However, at the time of the most recent amendment to the Fertilizer Regulations in 2015, at least four to seven categories of biofertilizers (Rhizobium, Azotobacter, Azospirillum, Mycorrhiza, Phosphate Solubilizing Bacteria and Potassium Solubilizing Bacteria) were popular in agricultural use. Microbial products could have been accommodated in the Fertilizer Regulations through appropriate amendments at that time. Such amendments would have positioned Canada as a leader on progressive legislation for innovative, ecological products. India showed the world such a path in 2006 by amending existing its law and incorporating biofertilizers as a distinct category of soil nutrients.

4.2. Registration of Manufacturers and Traders

Product registration is required for all fertilizers that have not been exempted. Registration is necessary to ensure that the circulation of products for research or commercial purposes has been authorized and that the products are safe, efficacious, and effective as per their label claims. According to section 5 of the Fertilizer Regulations, every application in respect of a fertilizer or supplement must contain a guaranteed analysis of the fertilizer or supplement as prescribed in section 15 of the Fertilizer Regulations. The guaranteed analysis is not comprehensive; rather, the parameters provided in the guaranteed analysis are merely indicative. By contrast, in the case of India, an applicant for the registration of a product is required to submit a declaration that the firm or company conforms to the technical specifications of the microbial product as laid down in Part A of Schedule III of the FCO. No efficacy test, guaranteed analysis report or field trial data is not required at the time of the registration process. Moreover, India's FCO provides detailed analysis parameters with laboratory analysis guidelines for all kinds of fertilizers, including ten different categories of biofertilizers. In addition, details on post-registration warehouse storage and inspection are also required.

Under Canadian regulations, biofertilizers are not listed in the registration application. The same is true for guaranteed analysis (section 15). Only the section 15(m) mentions manure, compost, humus or leaf mould, but these items are classified as organic fertilizers rather than biofertilizers or microbial products. Similarly, in the registration application (Schedule III of the Fertilizer Regulations), biofertilizers are not included as a separate category.

Furthermore, under Canada's Fertilizer Regulations, the required guaranteed analysis report is not specific to the type of fertilizer, and is less elaborate than India's fertilizer- or biofertilizer-specific standards/specifications.

Certain fertilizer products are exempt from registration under the Canadian regulations. They are the following: (a) a customer-formula fertilizer containing a pesticide registered under the Pest Control Products Act for the purpose stated on the label (section 3.1 (1)); (b) all items in Schedule II; and (c) organic matter made of peat, peat moss, sphagnum moss, tree bark and other fibrous organic matter that is represented for use only in improving the physical conditions of the soil.

Various items contained in Schedule II are already listed in the preceding subheading 'Background'. Notably, biofertilizers and microbial products are not included in Schedule II, implying that biofertilizers are not exempt and must be registered if manufacturing, import, trade, transport and sale are to take place in Canada. However, as noted above, biofertilizers are not explicitly recognized in the Fertilizers Regulations of Canada.

4.3. Precautions for Environmental Protection

According to the section 11(1) of Canada's Fertilizers Regulations, a fertilizer or supplement shall not contain (a) any substance in quantities likely to be generally detrimental or seriously injurious to vegetation (except weeds), domestic animals, public health or the environment when used according to directions, and (b) must not leave in the tissues of a plant a residue of a poisonous or harmful substance. Section 6.1 categorically prohibits the registration of products having adverse impacts on the environment and agroecology of farms. The guaranteed analysis (as per section 15) does not make any mention of an environment-related assessment of the product to be registered under the Canadian regulations. In other words, the registration process does not address the ecological compliance of products. However, post-registration the fertilizers and biofertilizers are monitored for environmental performance and compliance in terms of given indicators provided in section 11(1).

A comparison between Canada and India in relation to environmental precautions and preventions shows that Canada is better placed in terms of safeguarding agroecosystems and public health. India's regulations do not take into account any quality-related aspects, ecological risks, human or animal health safety, spillage, contamination, or occupational hazards. Nevertheless, the FCO has addressed quality control aspects indirectly in several ways, especially through stringent standards and specifications not only for conventional chemical fertilizers but also for biofertilizers, organic fertilizers and cake fertilizers (see Schedules I to V of the FCO).

4.4. Labeling

Canadian regulations focus on the labeling of containers and packages by setting strict norms for label information and registration. For example, according to section 7 of the Fertilizers Regulations, if label information is changed, new registration of the fertilizer (or biofertilizer) is required, demonstrating how stringent the labeling

requirements are. The regulation also provides support for the manufacturers, traders, sellers and users of fertilizers and biofertilizers in the context of labelling, as the instructions and standards for labeling are detailed and comprehensive (see sections 16-21 of the Fertilizers Regulations). In the same vein, India's regulation under clause 21(aa) of the FCO provides guidance to manufacturers, importers and pool handling agencies with respect to packing and packaging. Under India's regulation, which explicitly recognizes biofertilizers, containers must be clearly labeled with the word 'biofertilizer'. Other information printed on the packages or containers must be in accordance with the instructions released by the Controller (the registering authority in each state). This special treatment for biofertilizers is not given in the Canadian regulations. Finally, in sections or clauses dealing with labelling and packaging, neither the Canadian nor the Indian regulations address the risks of leakage/spillage and exposure to ecosystems and public health. Leakage and spillage from containers causing contamination, pollution, exposure to humans or animals, or occupational hazards are not systematically addressed in these regulations.

4.5. Sampling and Analysis

Sampling is highlighted in section 22 of the Canadian regulations. Section 23 provides that the analysis of fertilizer samples must be conducted using state of the art methods, stating that *"the methods of chemical analysis used to test a fertilizer or supplement shall be the latest methods published and approved by the Association of Official Analytical Chemists (AOAC International)."* Biofertilizers and microbial products are not explicitly addressed in this section. However, the 21st edition of Official Methods of Analysis℠ (OMA) of AOAC is said to be the most comprehensive and reliable collection of chemical and microbiological methods and consensus standards available (AOAC International), and the word 'microbiological' indicates that microbial products are addressed in the AOAC methods. Thus, the standards and methods given in this guideline may be applied to biofertilizers. Compared to the Canadian regulations, India's FCO is far more advanced, as it includes the sampling and analysis of chemical fertilizers, biofertilizers and organic fertilizers. The procedure and methods for all categories of fertilizer (including ten categories of biofertilizers) have been elaborated in Schedules I to V.

5. Conclusion and Recommendations

The unsustainable application of chemical fertilizers has caused a steady decline in soil and crop productivity the world over. Compared to biological products, chemical fertilizers pose higher risks to ecosystems, human and animal health, and occupational safety. Agricultural practices must evolve to sustainably meet the growing local and global demand for food without irreversibly damaging the world's agroecosystems and natural resources, including soil. Considering these circumstances, biofertilizers have received the global attention of scientists, research and development laboratories, manufacturing companies, sale and trade networks, and food producers. At the same time, the need to regulate the production, storage, transport, sale, trade, packing, packaging, use, disposal and labeling has emerged in different countries, especially

producer countries and importer countries. In India, biofertilizers came under legal regulation in March 2006 with amendments to the Fertilizer (Control) Order, 1985. Similarly, Canada regulates biofertilizers under the Fertilizers Regulations (C.R.C., c. 666) of the Fertilizers Act, 1985. India's legal framework relating to biofertilizers is amongst the most comprehensive in the world. The standards, specifications, analytical parameters, procedures, methodologies, and guidelines given in the FCO for biofertilizers are extremely detailed, as is attention to quality control and health and environmental risks. Quality control issues pertaining to biofertilizers are strictly regulated. It ensures the crop protection due to the ineffectiveness of biofertilizers. Consequently, economic losses and agronomic crop losses may be avoided. By contrast, the Canadian Fertilizers Regulations do not recognize biofertilizers or microbial products for soil fertility enhancement. In addition, the registration process for companies or firms wishing to manufacture, trade, sell, transport, store, use, import or export organic fertilizers is not as easy in Canada as it is in India. However, the Canadian regulations are more explicit and elaborate on issues of environmental protection, public health, safety and labeling (Canada Food Inspection Agency, 2020). The following recommendations are based on the gaps identified in the laws of both countries.

5.1. Recommendations for Indian Law

The only weakness of the FCO concerns safeguards for public health and environmental risks; quality-related aspects, ecological risks, human and animal health safety, spillage, contamination, and occupational hazards are not taken into account anywhere in the regulation. The FCO should amend existing provisions and bring in new notifications to adopt clauses to ensure ecological safety and to safeguard public health. Relevant provisions of the Canadian Fertilizers Regulation can be useful in this context. According to section 11(1) of the Fertilizers Regulations of Canada, a fertilizer or supplement shall not contain (a) any substance in quantities likely to be generally detrimental or seriously injurious to vegetation (except weeds), domestic animals, public health or the environment when used according to directions, and (b) must not leave in the tissues of a plant a residue of a poisonous or harmful substance. Section 6.1 categorically prohibits the registration to products having adverse impacts on environment and agroecology of farms. Furthermore, following registration, the Canadian regulation monitors fertilizers and biofertilizers for environmental performance and compliance in terms of given norms in section 11(1).

5.2. Recommendations for Canadian Law

Under section 11, Schedule II, the Fertilizers Regulations include organic fertilizers in the form of biologically dead & sewage wastes (clauses 1.11, 1.13, 1.15, 1.17, 1.19-1.20), organic waste (clauses 1.14, 1.16), compost (clause 1.18), and soybean cakes (clause 1.29). However, biofertilizers are not explicitly recognized in the regulation.

To remedy this situation, clauses explaining biofertilizers or their constituents should be included as a separate sixth class within the Schedule under section 11 through appropriate amendments. This legal reform would aid in greening Canada's fertilizer sector. Accordingly, the clauses and sections of the Regulations dealing with the registration process (Schedule III), labeling (section 7), and environmental health, ecological safety, etc. (section 11.1) would also cover aspects related to biofertilizers. For example, guaranteed analysis (section 15) would include biofertilizers along with manure, compost, humus or leaf mould. Similarly, with respect to the registration application, biofertilizers would be included as a separate category. The technical specifications for microbial products delineated in Part A of Schedule III of India's FCO can be helpful in broadening the guaranteed analysis (section 15) of the Canadian regulations. Finally, under section 7 of the Fertilizers Regulations, sections or clauses dealing with labelling and packaging, the risks of leakage/spillage, and exposure to ecosystems and public health should also be considered and addressed. Leakage and spillage from containers causing contamination, pollution, exposure to humans or animals or occupational hazards must be systematically addressed in the regulations.

Appendix 1

PRESCRIBED FORMS UNDER FERTILIZERS CONTROL ORDER 1957/1985

FORM A

(See Clause 8)

Form of Application to obtain Dealer's
(Wholesale or Retail or Industrial)
Certificate of Registration

To
The Registering Authority / Controller,
Delhi

1. Full Name and address of the applicant:
   (a) Name of the concern and postal address:
   (b) Place of business (Please give exact address)
      (i) for Sale
      (ii) for Storage

2. Is it a proprietary / partnership/limited Company / Hindu Undivided family concern? Give the name(s) and address(es) of the proprietor partners/manager karta.

3. In what capacity is this application field:
   (i) Proprietor
   (ii) Partner
   (iii) Manager
   (iv) Karta

4. Whether the application is for wholesale or retail or industrial dealership?

5. Have you ever had a fertilizer dealership registration certificate in the past? If so give the following details:
   (i) Registration Number:
   (ii) Place for which granted –
   (iii) Whether wholesale or retail or industrial dealership.
   (iv) Date of grant of registration certificate.
   (v) Whether the registration certificate is still valid?
   (vi) If not when expired
   (vii) Reasons for not removal
   (viii) If suspended / cancelled and if so when?
   (ix) Quantity of fertilizers handled during last year?
   (x) Names of products handled
   (xi) Names of source of supply of fertilizers.

6. Was the applicant ever convicted under the Essential Commodities Act 1955 or any order issued thereunder, including the Fertilizers (Control) Order, 1957, during the last three years proceeding the date of Application, if so give details:

7. Give the details of the fertilizer to be handled:

S.No.	Name of Fertilizer	Source of Supply

8. Please attach certificate (s) of source from the supplier(s) indicated under column 3 of sl. No. 7.

9. I have deposited of the registration fee of Rs…….. vide Challan no…….. dated ……. in treasury / Bank …… or enclose the Demand Draft No. ……. Dated …… for Rs……. Drawn on …… Bank, in favour of ……. Payable at ……. Towards registration fee (Please strike out which ever in not applicable).

10. Declaration:
    (a) I/We declare that the information given above is true to the best of my/our knowledge and belief and no part there is of false.
    (b) I/We have carefully read the terms and conditions of the Certificate of Registration given in Form 'B' appended to the Fertiliser (Control) Order, 1985 and agree to abide by them.
    (c) I/We declare that I/We do not possess a certificate of registration of Industrial dealer and that I/We shall not sell fertilizers for industrial use (Applicable in case a person intends to obtain a wholesale dealer or retail dealer certificate of registration, excepting a state Government, a manufacturer or a pool handling agency).
    (d) I/We declare that I/We do not passes a certificate of registration for wholesale dealer or retail dealer and that I/We shall not sell fertilizers for agricultural use. (Applicable in case a person intends to obtain a industrial dealer certificate of registration, excepting a State Government a manufacturer or a pool handling agency).

Dated ……. Signature of the Applicant(s)

Note:
1. Where the business of selling fertilizers is intended to be carried on at more then one place a separate application should be made for registration in respect of each such place.
2. Where a person intends to carry on the business of selling fertilizers both in retail and wholesale business should be made
3. Where a person represent intends to represent more than one State Government, Commodity Board manufacturer of Wholesale dealer, separate certificate of source from each such source should be enclosed.

For use in the office of Registering Authority/Controller.

Date of receipt. Name & Designation of Office receiving the application

Appendix 2

FORM 'O'

[See Clauses 8 and 11]

Certificate of Source for Carrying on the Business of Selling Fertilizers in Wholesale/Retail for Industrial Use

No.001. Date of Issue 2018-06-14

1. Particulars of the concern issuing the certificate of source:

   (a) Name and full address:

   (b) Status: (i) State Government
   (ii) Manufacturer
   (iii) Pool handling agency
   (iv) Wholesale dealer

   (c) If manufacturer of mixture of fertilizers, the details of certificate of manufacturing of mixture of fertilizers being possessed:
   (i) Number
   (ii) Date of Issue
   (iii) Date of expiry
   (iv) Grades of mixtures of fertilizers allowed to be manufactured
   (v) Authority by whom issued

   (d) Details of certificate of recognition:
   (i) Number:
   (ii) Date of issue:
   (iii) Date of expiry:
   (iv) Authority by whom issued:

2. Particulars of the person to whom the certificate of source is being issued:

   (a) Name and full address:

   (b) Status: (i) Wholesale dealer
   (ii) Retail dealer
   (iii) Industrial dealer

   (c) If holds a valid certificate of registration, the details thereof:
   (i) Number :
   (ii) Date of issue :
   (iii) Date of expiry :
   (iv) Authority by whom issued:

   (d) Purpose of obtaining the certificate of source:
   (i) For obtaining a fresh certificate of registration
   (ii) For renewal of the certificate of registration

3. Details of the Fertilizers to be supplied:

Sl.No.	Name of Fertilizers	Trade Mark/ Brand Name
1	2	3
1.		
2.		
3.		

4. *Declaration*: Declared that the fertilizers mentioned above will be supplied conforming to the standards laid down under the Fertilizer (Control) Order, 1985, and as the case may be, grades/formations (of mixtures of fertilizers) notified by the Central/State Government and packed and marked in container as provided under Clause 21 of the Fertilizer (Control) Order, 1985.

Signature with stamp of the
Authorized Officer

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