The Legislation of Agrochemicals in Citrícola Production in the Municipality of Capitão Poço, Pará

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Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JEAI/2020/v42i3

Received 16 April 2019
Accepted 22 June 2019
Published 17 April 2020

ABSTRACT

Brazil is one of the largest producers of sweet orange (Citrus sinensis L. Osbeck) in the world. The State of Pará is responsible for 1.02% of the production of Orange in Brazil. Of this amount, the municipality of Capitão Poço is responsible for 57% of the total produced by the State. In view of this, it is evident that the model of current economic development imposes transformations in the way of life that entail serious problems of health to the worker, for example, the exposure of the workers to the pesticides in the field. With this, it is noticed that it is important to deal with the legislation of Agrochemicals because this is still little known by most citricultures in the municipality of Capitão Poço, leading them to non-compliance with the law. From this, the objective of the research was to observe the potentials and limitations regarding the distribution chain, acquisition and use of agrochemicals and knowledge of the laws in the citriculture Paraense. For the development of the work, questionnaires were applied (based on the Agrochemicals Law - Law No. 7,802 of July 11, 1989, and the Law of Packaging - Law No. 9.974 of June 6, 2000) in the community of Nova Colônia. It is concluded that the laws, besides not being known and
consequently not fulfilled, make it difficult to supervise the specialized professionals, who, in turn, are few for the region. Another obstacle to compliance with legislation is to make the producer update certain concepts and teachings, which are no longer accepted.

Keywords: Citrus; greeting; oversight; producer.

1. INTRODUCTION

The Brazilian citrus agroindustrial system has been developing over the years and is now well established, being one of the most competitive systems in the production of orange juice. This happened thanks to the “know how” acquired during these years of development. Today is a delicate moment, with some factors affecting the Brazilian agroindustrial system. Thus, there is a clear perception that the sector is devoid of definitive organization, encompassing all the links of the agroindustrial system [1].

Brazil is one of the largest producers of sweet orange (Citrus sinensis L. Osbeck) in the world, and most of the orchards are located in the state of São Paulo, southwestern Minas Gerais and south of the Triângulo Mineiro, with a citrus park estimated at 174.13 million productive trees and estimated to produce 286.14 million boxes of 40.8 kg in the 2015/16 harvest [2].

The production of oranges in Brazil in the 2016/2017 harvest is expected to reach 351.7 million boxes of 40.8 kilos, 14% lower than the estimated 409.7 million boxes in 2015/2016, points out the United States Department of Agriculture (USDA) in São Paulo. The justification for this decrease can be attributed to the unfavorable climatic conditions that hampered the development of the fruits [2].

The State of Pará accounts for 1.02% (258,758 tons) of Orange production in Brazil, of which the municipality of Capitão Poço is responsible for 57% (146.370 tons) of production [3]. However, the high cost of production is mainly due to the high rate of diseases, pests and competition for labor, which, in addition to scarcity, are the most paid rural workers in the class, which shows difficulties for producers [4].

Since 2008, Brazil has become the largest consumer of pesticides even without being the main agricultural producer in the world. The abusive use of these products poses a number of problems, ranging from those that affect the health of farmers to those that affect the environment, destroying fauna and flora or, in short, the totality of our biodiversity [5,6].

In view of this, it is evident that the model of current economic development imposes changes in the way of life that lead to serious health problems for the worker, such as the exposure of workers to pesticides in the field. These conditions interfere in the quality of life, negatively impacting the health of rural workers and the environment [6].

Law No. 7,802, Law of Agrochemicals of July 11, 1989, provides for research, experimentation, production, packaging and labeling, transportation, storage, commercialization, commercial advertisement, use, import, export, final destination of waste and packaging registration, classification, control, inspection and inspection of agrochemicals, components and the like. The inspection of the correct destination of empty containers of pesticides is based on Law 9,974 of June 6, 2000, which amends Law No. 7,802 of July 11, 1989 [7].

The use of agrochemicals in the Capitão Pocense citrus growers generates discussions and problems that are debated by researchers of the most varied areas, since, although this practice is quite common in the plantations of the studied place, it is often carried out unduly by unprepared and unprepared people training. With this it is noticed that it is important to deal with the legislation of Agrotóxico because it is still little known or even unknown by most citrus growers in the municipality of Capitão Poço, leading them to non-compliance with the law.

From this, the objective of the research was to observe the potentials and limitations regarding the chain of distribution, acquisition and use of pesticides and the knowledge of the laws in the Paraense citrus growers.

2. MATERIALS AND METHODS

The municipality of Capitão Poço is located in the state of Pará, at a latitude 01º 44’47” S,
Longitude 47º 03' 34" W, altitude 73m and total area equal to 2727 km$^2$. The climate of the region, according to the classification of Köppen, is of type Am with annual precipitation around 2500 mm, with a short dry season between September and November (monthly precipitation around 60 mm), average temperature of 26°C and relative air humidity between 75% and 89% in the months with lower and higher precipitation, respectively [8]. Captain Poço is one of the citrus poles with national prominence, because of this, a considerable number of producers work with citiculture.

For the development of the work, questionnaires were applied (based on the Agrochemicals Law - Law No. 7,802, of July 11, 1989 and the Law of Packaging - Law No. 9.974 of June 6, 2000) in the community of Nova Located in the municipality described above.

The Community of Nova Colônia is located in the Municipality of Capitão Poço, State of Pará, on the banks of PA-124 (Capitão Poço-Ourém), distant approximately 15 km from the seat of the municipality. The predominance of soils is of the type Dystrophic Yellow Latosol, medium texture and average annual temperature of 26°C, with average rainfall of 2,700 mm monthly [9].

In order to ensure the quality of the information, some fundamental procedures were adopted during the data collection phase. Initially, the agricultural director or manager of each property was identified, sufficiently familiar with the concepts of pesticides and general information regarding the procedures performed in the area and treatments performed in the crop and that supposedly had the technical condition to pass on the information required, since the questions were highly specialized. Once identified, he was asked to visit his property, in which the questionnaires were applied. In addition, visits were made to the areas to know the productive reality of the interviewees.

The period of analysis of this study was from June 2015 to January 2016. The questionnaires were applied to citrus producers in these communities.

The survey of the citrus producing units was carried out using data provided by the local office of EMATER/PA, which suggested the delimitation of strategic and influential areas in citrus production in the municipality, according to the recommendation of the local agronomist, the community production and the great diversity of production. In this case, it was decided to frame the producers in groups, thus facilitating the interviews, description and evaluation of the work, as can be seen in Table 1.

### Table 1. Classification of the producers in relation to the total amount of citrus planted in the communities of Nova Colônia, in the municipality of Capitão Poço/Pará

<table>
<thead>
<tr>
<th>Typification of producers</th>
<th>Number of plants</th>
<th>Quantities of producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Below in 1500</td>
<td>14</td>
</tr>
<tr>
<td>Type 2</td>
<td>1500-3000</td>
<td>10</td>
</tr>
<tr>
<td>Type 3</td>
<td>3000-6000</td>
<td>5</td>
</tr>
<tr>
<td>Type 4</td>
<td>Above in 6000</td>
<td>7</td>
</tr>
</tbody>
</table>

Data analysis was performed from data collection using simple descriptive statistics, with the aid of Excel software, where the actual values collected in the interviews were transformed into percentages and the graphs and tables prepared for transformation into qualitative data.

### 3. RESULTS AND DISCUSSION

The interior in question presents peculiarities as to its form of production, relying on predominantly family agriculture. As can be seen in Table 2, family labor has great significance in the New Colony region, more frequently in the type 1 producers, because the areas to be worked are smaller, so the producer manages to supply the demand for job.

### Table 2. Profile of producers and their various forms of production within the agricultural setting of Nova Colônia, in the municipality of Capitão Poço

<table>
<thead>
<tr>
<th>Typification of producers</th>
<th>Used labor</th>
<th>Cleaning the area</th>
<th>Technical assistance Yes/Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Family</td>
<td>brushcutter/Chemistry</td>
<td>64.28/35.71</td>
</tr>
<tr>
<td>Type 2</td>
<td>Family/Contractor</td>
<td>brushcutter/Chemistry</td>
<td>40/60</td>
</tr>
<tr>
<td>Type 3</td>
<td>Family/Contractor</td>
<td>brushcutter/Chemistry</td>
<td>20/80</td>
</tr>
<tr>
<td>Type 4</td>
<td>Contractor</td>
<td>Tractor/Chemistry</td>
<td>42.86/57.14</td>
</tr>
</tbody>
</table>
A crucial step for the good development and continuity of the planting is the clearing of the area, that is, under what conditions the citrus will be and the way it will compete with other species in the field, so this phase is, notoriously, a great producers' concern as it may limit production.

Among the most used forms of cleaning in the region, we have used the brushcutters, easily visualized in Table 2, gaining great expressiveness, especially for the producers who move from type 1 to type 2, their purchase is more accessible and requires less maintenance. For type 4 producers, the use of the brushcutter is replaced by the tractor, as the cost / benefit ratio is positive.

However, the alternative most used by most, if not all producers in the New Cologne region, as observed in Table 2, is the chemical, because it is cheaper and because the production history of use is more common. However, the use is made in a disorderly and erroneous way, thus undermining the medium and the manipulator / applicator.

Evaluating Table 2, it can also be observed that the producers use chemical weeding reconciled the other activities, justifications that are given for the use of these products are the lack of better alternatives and the impossibility of producing without their use, that is, the producer limits and conditions their production to the use of chemicals, which are not always being used correctly (doses, purpose, specificity, time, culture and etc.) and which may be generating the opposite effect.

As for technical assistance, it is generally noted that the region studied presents a major problem, basically because technicians need to meet the demand of producers from all over the municipality of Capitão Poço, making difficult the constant assistance to them. This difficulty can be seen in Table 2, producers type 2, 3 and 4 have a lower percentage of technical assistance.

For the type 1 producers, the scenario is different, mainly by the participation in associations. Thus, for type 1 producers, 64.28% of respondents receive technical assistance, which often occurs in a group way in associations.

It is worth noting that the lack of technical assistance for the orange crop makes it impossible to disseminate specific information on the application of agricultural pesticides, which contributes to formulation and application errors and thus increases the potential risks of contamination of the environment and farmers, who are almost all involved in the agricultural process [10].

The purchase of the product can be purchased sealed or divided, which can only be done according to Law 7.802 of July 11, 1989, in the case of establishments duly accredited under their responsibility, in places and conditions previously authorized by the organs [7].

In practice, there is a complex and differentiated reality, although most producers buy sealed products, there is still a percentage that opts for fractional products or that are indifferent to this consumption.

In the case of producers type 1, 3 and 4, shown in Table 3, 100% buy sealed products, the justification is that the purchase of fractionated product makes it expensive, another justification is that the agricultural houses are no longer selling the fractioned products, it is worth noting that this is an economic and not a legislative measure for traders, because when asked about why they do not sell fragmented products, most respond that it is more laborious and not advantageous, some traders cited inspection as the main impediment to commercialization of fractional products.

Type 2 producers have a percentage of 10% who buy fractional products, which can lead to several problems. Legally and environmentally incorrect, it can harm human health, in addition to losses in these products by volatilization, losing their properties and consequently not meeting their purposes.

Another factor that must be observed at the time of purchase is the shelf life of the products, as this may condition the best result. Of the producers interviewed, Table 3 shows that most of them are very worried about this factor. In type 1, 2 and 3 producers, 92.86%, 96% and 100%, respectively, do not buy overdue products, since they know that after the expiration date the products may not present the same yield and at the time of purchase this is the first factor that is observed by them, the minority that acquires product overdue, says that it acquired the same due to be passed on for smaller values or for not providing attention at the time of purchase.
Table 3. Profile of the producers regarding the package leaflet, the grace period and indication range for the use of chemical products in the Nova Colônia region, in the municipality of Capitão Poço

<table>
<thead>
<tr>
<th>Typification of producers</th>
<th>Producer reads the label (%)</th>
<th>Obey the grace period (%)</th>
<th>Observe the product indication range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>28.57/71.43</td>
<td>21.43/78.57</td>
<td>28.58/71.42</td>
</tr>
<tr>
<td>Type 2</td>
<td>20/80</td>
<td>80/20</td>
<td>60/40</td>
</tr>
<tr>
<td>Type 3</td>
<td>20/80</td>
<td>40/60</td>
<td>80/20</td>
</tr>
<tr>
<td>Type 4</td>
<td>57.14/42.86</td>
<td>57.14/42.86</td>
<td>71.44/28.56</td>
</tr>
</tbody>
</table>

Another important factor is the reading of the labels and information contained in the product, the average number of people who read is very low, being reported as the main reasons: because they follow the same recommendations followed by the neighbors or the clerk of the farm house, which in the most of the time they are not specialists in the field, and in other cases the rural producer does not know how to read.

Another complex situation regarding the reading of the labels and recommendations contained in the chemicals reported by the producers is the difficulty of understanding what is written, because there are some technical terms used that are different from those that the producer knows in the daily life.

As can be seen in Table 3, of type 1, 2 and 3 producers only 28.57, 20 and 20% read the label, reflecting in a very low amount and despite the population being sampled, it is a reality that extends through the majority of producers in the region.

Despite the availability of information contained in all agrochemical labels, not all are read and understood by farmers. The size and lack of objectivity of the text were also obstacles cited by 35% of respondents, who claimed they did not have the patience to read through and find the information they needed [11].

The type 4 producers present a differentiated profile, since any problem caused by the lack of information will directly reflect the producer's earnings, which may lead to a significant loss of capital, in this case the tendency is for these producers to have the most frequent habit of doing reading, or even when they hire or have access to care are more carefully informed through these prescriptions. The percentages for type 4 are 57.14% who read the label.

The grace period or safety interval is defined as the number of days that must be respected between the last application of the pesticide and the harvest and serves to ensure that the food harvested has no residue above that allowed. This period is described on the label of the pesticide and varies according to each product.

The type 1, type 2 and type 3 producers that present a percentage of 21.43%, 80% and 40%, respectively (Table 3) follow the grace period, but not that established on the label, this grace period is respected in a way unconscious, often, because they make the application and because they do not harvest immediately they end up having this rest period of the culture.

When questioned about this factor, they commented that it does not influence their harvest criteria and they think that if the product is not applied directly to the plants, in the case of herbicides, they will not need to respect this safety period. In the case of the type 4 producers, observed in Table 3, the percentage is 57.14% that obey the grace period.

When buying the products, there are some ranges in the packages that serve to identify the degree of dangerousness, which will indicate which products are more and less toxic and with the promulgation of Law 7.802, on July 11, 1989, regulated by Decree 4.074, of January 4, 2002, it can be said that Brazil has taken the definitive step in the direction of aligning the quality requirements for agricultural products demanded in domestic and international scope.

In the case of the interviewed producers, in Table 3, type 1 presents a percentage of 1.42% for producers who do not take into account the range of indication at the time of purchase, moreover, these producers, for the most part, can not to identify the degree of dangerousness by observing only the bands, this is because producers hardly read the label and when they do have difficulty understanding, because all this information is being explained in the prescriptions that accompany the chemicals.
For producers type 2, 3 and 4, this profile differs is some producers look for the presence of these bands and know what they mean. These signs, as well as images and drawings present on the packaging are mandatory and according to the constitution, will serve to alert the producers about the danger that these products bring.

As mentioned in Law 7.802, in Article 7, where: In order to be sold or offered for sale throughout the national territory, agrochemicals and related products are obliged to display their own labels, written in Portuguese, containing general and specific product data, such as information on potential hazards, including: The possible harmful effects on the health of humans, animals and the environment; precautions to avoid harm to the persons who apply or manipulate them and third parties, domestic animals, fauna, flora and environment; hazard symbols and standardized warning phrases, according to the toxicological classification of the product and instructions for the accident, including alarm symptoms, first aid, antidotes and recommendations for physicians, drafting given by Law 9.974 of 2000 [7].

The lack of understanding of the risks farmers are exposed to when applying such products demonstrates that pesticide label warnings are ineffective and do not fully fulfill the role for which they are intended [12].

In order to justify good management and applications of agrochemicals and their related products correctly, it is necessary for the producer to have knowledge of the laws, which support their use and all the processes that are carried out.

It is easy to see that few people have the knowledge of the law, many have heard random concepts but have not been informed about the existence of a document that regulates the use of pesticides and the destination of the packaging. This is a bad thing, because in addition to leaving the farmers, sellers and recipients of the products and packaging working illegally, it makes it difficult for the state and federal agencies to charge, because whenever a fiscalization is carried out, these agents will justify the misuse due to lack of knowledge.

So even before using strategies to charge and punish these users it is necessary to inform them and raise awareness about the existence of laws that regulate the use of chemicals, as cited in Law 7.802: The companies that produce and commercialize agrochemicals, their components and the like, will implement, in collaboration with the Public Authorities, educational programs and mechanisms to control and encourage the return of empty containers by users within a period of one hundred and eighty days from publication of this law (Included by Law 9,974, of 2000).

As can be seen in Fig. 1, in the New Cologne region, 97% of the producers interviewed are not aware of these laws. The remaining 3% have heard of the law, but they do not follow it strictly and the justifications they use are that the law is very judicious and out of the reality of most producers, in this sense, complying with them ends up making production much more expensive.

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**Fig. 1. Knowledge of pesticide legislation and packaging in the region of Nova Colônia, in the municipality of Capitão Poço**
When buying the products, an important activity to do before using them is storage, because if placed in the wrong places and close to human and animal life, accidents may occur, in addition to possible contamination of the environment in which they are inserted.

Fig. 2 shows that most of the producers, specifically 44%, store their products in sheds, which do not always have the ideal storage conditions, because they are located near the residences.

Another common form of storage is the "shacks", structures built in the backyards of the producers' houses, made of wood or clay, do not have any of the standard conditions for storage (they must be well ventilated, dry, free of sun and rain, besides being stored isolated from other products and implements), are usually made when the producer does not have the financial condition to build better elaborated structures. Storage in these structures was 14% (Fig. 2).

A significant percentage is also the storage in the rooms of the house, around 33%, very common in the region and one of the most dangerous forms of storage, because it leaves the product directly in contact with the daily life of the residents of the house.

Accidents may occur through ingestion of the product or inhalation by the release of compounds into the air. The other forms of storage are quintal, with 6% and in the area of the association, with percentage of 3%. It is evident in the research that 100% of the producers interviewed do not store the products and the packaging correctly.

Wrong storage was also verified in other studies, where about 50% of farmers interviewed stored products incorrectly, even inside their homes, which increases the risk of exposure and contamination to a larger number of people [13].

In addition, Figs. 3, 4, 5 and 6 illustrate the inadequate storage and disposal methods used by producers within the municipality of Capitão Poço.

Another important variable, especially when it comes to legislation, is the correct destination of the packages, clearly, it can be seen in Figs. 3, 4, 5 and 6 that the producers do not correctly design the packages after use.

The various purposes that are given for these packages can be seen in Fig. 3, where 39% of producers reuse the packages, whether for harvesting, loading water for spraying or for transporting fuel. 19% of the packaging is burned, a practice that harms the environment a lot, as there are chemical releases, besides the problem caused in the atmosphere with the release of toxic gases to the environment. There are also those producers who leave the packaging in the field (28%) because they do not know how to store or do not have structures for storage.

Only 6% of the packages are returned, most of the time this type of return is made by type 4 producers, and when they return they do not perform the proper washing (triple washing). It is important to note that even with the requirement, some producers do not return. Another 5% of the containers are grounded, in places near the production areas or in the residences, 3% are stored in sheds, shacks, rooms of the house and the like.
Despite the existence of regulations regarding the commercialization and management of agrochemicals, many users do not comply with all the rules imposed by the legislation, and do not take care of them when handling them [13].

As mentioned in Law 7,802, paragraph 2: Users of agrochemicals, their components and the like must return the empty packaging of the products to the commercial establishments where they were purchased, according to the instructions provided in the respective labels, within a period of up to one year, as of the date of purchase, or a longer period, if authorized by the registering body, and the return may be intermediated by points or collection centers, provided they are authorized and audited by the competent body (included in Law 9.974 of 2000).
According to the legislation, the purchase of the products through the presentation of the agronomic prescription is indispensable, however this reality is far from being witnessed in the studied community.

Law No. 7,802, in article 13, provides for the sale of pesticides and related products to users through their own prescription, prescribed by legally qualified professionals, except in exceptional cases provided for in the regulation of this law.

Note that of all the producers interviewed, in Table 4, there was never the requirement of agronomic prescription in the purchase of the products. This can be justified again by the lack of information from the producer and the other links in the chain, the lack of technical assistance to enable the qualified professionals (agronomist and forestry engineer for their respective areas) to perform their function and agronomic recipes.

Another important factor that has been ignored by most producers is the Personal Protective Equipment (PPE), which serves to make the use of pesticides safer and more correct. For its use are made some standard recommendations that follow a logical sequence for use, according to the recommendations approved by the organ responsible for Human Health - National Agency of Sanitary Surveillance (ANVISA).

The real reality is the non-use of this equipment, or even its incomplete use. The justification given by the applicators is the discomfort that this protective clothing offers, causing a low income at work, so most of them choose not to use the equipment and put their health at risk.

Observing Table 4, only type 2 and 4 producers and in small percentage, 10% and 28.57% respectively use the equipment. Of the producers interviewed, all had knowledge that the equipment should be used, but they do not do it according to the legislation by the adaptive issue.

This criticism about the discomfort of working with EPI was also reported in several interviews with farmers who carried out the application of chemicals, being a known technological problem and should gain more attention or even a more comfortable version that would encourage the complete use of this equipment. The results are presented in Table 1 and Table 2).

Failure to use PPE may cause direct and indirect problems for producers. The abusive use of chemicals can harm the environment beyond human health and this needs to be further debated and taken into consideration. Few producers can identify when they have accidents or health problems related to the use of pesticides, however, many of the daily symptoms may be a consequence of the inadequate management promoted by these applicators.

Many cases of intoxication could also be avoided with the use of adequate protection, such as PPE that is intended to protect the worker's physical integrity. However, it is not used by all farmers, and when used, is usually done incorrectly [14].
Table 4. Use of agronomic prescription and Personal Protective Equipment (PPE) in citrus cultivation in the Nova Colônia region, in the municipality of Capitão Poço

<table>
<thead>
<tr>
<th>Typification of producers</th>
<th>Agronomic recipe (%)</th>
<th>Utilization of PPE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipo 1</td>
<td>0/100</td>
<td>0/100</td>
</tr>
<tr>
<td>Tipo 2</td>
<td>0/100</td>
<td>10/90</td>
</tr>
<tr>
<td>Tipo 3</td>
<td>0/100</td>
<td>0/100</td>
</tr>
<tr>
<td>Tipo 4</td>
<td>0/100</td>
<td>28.57/71.43</td>
</tr>
</tbody>
</table>

The lack of clarification on the handling of pesticides contributes to cases of intoxication that could be avoided if there were more information and an awareness that pesticides, when not used correctly, can cause great harm to the health of those who come into contact with them [15].

The region of New Colony, as well as the municipality of Capitão Poço in general, has a very strong agricultural profile, mainly in citiculture, however, still presents in its history a restricted form of production, due to the lack of investments and policies that bring with it possibilities.

The lack of information through public and private entities and technical assistance are the main limitations found for the knowledge and use of legislation in agricultural production, which causes the producers to harm the health of fauna, flora and human health, besides production.

The activities carried out during the execution of the work left many worries, since it was observed that there is a great deficiency in relation to the information of the interviewees, especially when it comes to the rural producers, who handle these chemical agents, the agrochemicals, without previous knowledge of the its effects and action on health, the environment and the whole society. For citrus growers, it would be important to raise awareness of them through lectures, courses and workshops where the practices of educational and awareness forms were active, targeting not only the economic, but also the social and ecological.

4. CONCLUSION

The activities performed during the execution of the work left many concerns, as it was observed that there is a very large deficiency in relation to the information of the interviewees, especially when it comes to the rural producers, who handle these chemical agents, which are pesticides without prior knowledge. its effects and action on health, the environment and society as a whole. For citrus growers, it would be important to raise their awareness through lectures, courses and workshops where the practices of educational and awareness forms were active, targeting not only the economic, but also the social and ecological.

The law, in addition to not being known, is not fulfilled, making it difficult to supervise the specialized professionals, who in turn, are few for the region. Another obstacle to compliance with legislation is to make the producer update certain concepts and teachings, which are no longer accepted.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/47795