Journal of Modern Education Review, ISSN 2155-7993, USA
November 2018, Volume 8, No. 11, pp. 872–882
Doi: 10.15341/jmer(2155-7993)/11.08.2018/009

http://www.academicstar.us

Education in Chemistry and Agronomy for Field Education

Juliano da Silva Martins de Almeida[1], Welson Barbosa Santo[2], Sara Botão[3], Amanda de Oliveira Souza[4]
(1. Federal University of Catalan, Brazil; 2. *Subjectivities of Teacher Training for Field Schools, Brazil;*
3. Goias Federal University, Brazil; 4. Goiano Federal Institute, Brazil)

Abstract: This article aims to discuss the importance of the Education in Chemistry and Agronomy for the Degree in Field Education. Our research was to understand if a scientific content produced in the academy can serve as reference for in the disciplines of Agronomy and Chemistry in Licenciatures, but specifically to Field Degree Programs, serving thus, as an articulating theme between these two areas, the practices applied to Agroecology. To support the work methodologically, Michel Foucault's studies on discourse, and through interviews, was accessed what two academics of the area, invited to value the propose were taken as reference, think about the issue after analyze the content and project. In this way, one of the observations perceived in the speeches of both scholars is that using the teaching of Chemistry and Agronomy to provide theoretical subsidies centered on the same theme and practical problem, can serve as a basis for a better contextualization to the students of the course of Education of the Field and can enable the disciplinary approach so required in our time.

Key words: field education, agroecology, agronomy, chemistry, phosphogesso

1. Introduction

It is a consensus in education, especially in undergraduate courses, and because this is no different in the field education degree, educational models based on the traditional view of scientific activity do not fully comply with the challenges of our time (Oliveira, 2003). Thus, we agree with Kradsilchik & Trivelato (1995) that the traditional perception of education is misconception for disseminating truths understood as totalizing and be based on the principle that those authorized to speak of science, are the scientists for understanding this activity in detail.

In an objective way, for Oliveira (2003), these questions strengthen the concept that the scientist would be the legitimate bearer of absolute truths, efficiency, neutrality and total objectivity regarding natural phenomena, thus detracting from the cultural knowledge present in the activities subjects. With this, the inheritance of this posture has also strengthened the idea of scientific neutrality and the hierarchy of scientific knowledge about other forms of knowledge.

In totalizing knowledge field, although they are concepts historically established and diffused by the different spaces of society, such precepts are devoid of deconstruction and overcoming. In this perspective, Krasilchik (2000) states that it is interdisciplinary articulated teaching that can contribute to the understanding that scientific knowledge is human, temporal, partial, inconclusive and associated with economic and political interests. More broadly, the author still subsidizes affirming that is the articulation of philosophy and history, beginning in the

Juliano da Silva Martins de Almeida, Doctor of Chemistry, Universidade Federal de Goiás; research areas/interests: chemistry education. E-mail: juliano.feq@gmail.com.

nineteenth century, assisting and complementing different knowledges such as Chemistry and Agronomy in teaching, which can support the conceptual deconstruction of science while holder of a sovereign, complete, absolute, perfect and total knowledge.

In regarding of the specific question, in Brazil of our time it's known that this conception also has as limiting factor the level of training available to the educator. In this sense, Krasilchik & Marandino (2004) confirm that teacher training is deficient, and in the areas of Chemistry they present limited curricula and contents taught in a fragmented and isolated way. According to Tardif (2004) and Cunha & Krasilchick (2000), undergraduates value scientism and technicality, distancing scientific knowledge from everyday knowledge.

When we make such considerations about knowledge in the field of Chemistry, we must also consider that in Agronomy, the investment for a perspective of agronomic training committed to the training of teachers basically does not exist. Imbued with a commitment of land production and knowledge to implement it, little is invested in the training of professionals to act in different forms of teaching. In this sense, we must consider that it comes from the big business groups subsidies of considered weight for the development of the sciences. In the midst of such questions, the formation of the agronomist becomes a central and hostile target when we consider production and profit, even if the price of such an action is the demerit of the small farmer and all the subsistence activity that involves him.

When we focus this discussion on undergraduate courses, we have to consider the question that education and the teaching method go through moments of crisis and reconstruction of thought. In this sense, the role of education is to play a critical reflection, because the epistemological analyzes of science have found guidelines to guide the approach of both daily knowledge[1] and scientific knowledge[2] and, consequently, its construction in school knowledge. But to do this, one must understand what characterizes both knowledge and how it is defined; this will enable them to be rebuilt and bring them to the masses.

In expanding the discussion about teacher education, specifically for Field Teaching, Caldart (2002) affirms that it is an academic work in which the professionals involved have much to learn, reflect and teach. In this reasoning, the author allows to affirm that there is no way to educate the people of the fields, in a true way, without transforming the current conditions of their existence and the proper valuation of their knowledge, their culture and their identity as a peasant. For Molina (2006), this awareness is conquest of the countryside, resulting from the demands of social movements gradually strengthened in the last two and a half decades.

Based on these aspects, we believe in an initial formation that values everyday knowledge and also brings scientific concepts in the field of Agronomy and Chemistry, can a way contribute to the theoretical and practical formation of these practices of this future professionals. This is possible due we are in face of two areas that, in spite of, this systematic knowledge that they constitute, are being close, the form as they are insert in the formation process, conduct theses professional to distincts aways. In the case of Teacher Education in the Fields

1 Regarding everyday knowledge, as the name itself already defines it, is that generated from the observation of natural factors and then become (or not) scientific. It is not based on experimentation, but on facts experienced by someone who may (or may not) possess the pretense of making that scientific knowledge. The everyday knowledge coexists with other sources of knowledge becoming contradictory at times. Still, we can say that a context is needed to be produced (Dias, 2008).

2 The scientific knowledge is the privileged locus of a set of activities and knowledge that methodically and systematically is produced by science. They proceed and have as their role to promote technological and social advances, proportional to the interests that involve them. However, despite having experimental basis is not unquestionable being able to be challenged and lose its supposed truthfulness. It is a knowledge that can be completely independent of a predetermined context using generalized affirmations and can be applied to different situations and times. And yet, it may be irrefutable truth at one time and absurdly wrong at another. Also, it is common for schools to arrive to compose their curriculum, added to everyday knowledge (Dias, 2008).

Education, what we have notice, is that meeting of this both professionals, and challenged at the same agreement, but they still are isolated.

Our propose in this presented discussion is to demonstrate that such knowledge are so close that they can be worked on common disciplines to both areas, at least, in part of the formation process. In face of this exposition, we will treat for this discussion, part of experience of one of these two authors. Our challenge is to point that beyond of one scientific knowledge, such knowledge are considered important for life in the fields, for the environment challenges of our time, they are supportive for determinates kind of agricultural and still, know systematized that, working together in the teaching of the Chemistry and Agronomy in Teacher Education in Fields Education, can to accomplish your role.

2. Chemistry and Agronomy in the Construction of the Knowledge about the Phosphogypsum: Production and Applicabilities

Consider that the last decades were characterized by the great urban and industrial growth in several countries, and, accompanied by this expansion; the movement of social groups concerned with the increasing degradation caused to the environment was observed. Pollution of the air and of hydro resources; extortion of animal species and vegetables; climatical changes; and, ground contamination for industrial waste, are examples of those impacts occurred in the nature. As the wastes, especial the industrial ones, those are the most worrisome, because they have high pollution power of the air, the water, and the ground, needing of forms suitable of treatment and storage (Araújo & Fernandes, 2013)

Between diversity industrial activities that generate consider waste volume; we can cite the production of phosphor acid, and posteriorily, employed in the obtention of agriculture fertilizers like phosphate fertilizer. In Brazil, the annual production of phosphate acid, ultra exceeds the marking of 1.2 millions of tons of P_2O_5, which represents more of 77% of production of Latin America and a fell more of 3% of the world production (Silva & Giulietti, 2010). The principals Brazilian industries are localized in the cities of Uberaba – MG, Cubatão – SP, Cajati – SP, with annuals productions of 675.000, 128.000, 180.000 t/ano, respectively, and Midwest in the city of catalão – GO. The fertilizers in special, the phosphates are fundamental to impulse the agriculture production in diversities areas of the earth, because, the supply the nutrition necessities of the plants. According to datas from National Association for Fertilizer Diffusion (ANDA, 2012), the larger consumers of the mineral fertilizers in the world, are: the China (33%), the India (17%), the United States (12%) and the Brazil in the fourth position, consuming about of one third (1/3) of the country consumes, that is, it is necessary to import two-thirds (2/3) of our mineral fertilizer needs.

In production fertilizers phosphates, utilizes phosphates ores, which during the process of industrial procurement pass for phases of physical improvement, chemistry treatment, and posterioly, the preparation of mixtures to be applied in the ground. Nevertheless, according to Cekinski (1990) and Saueia et al. (2005), exists the radioactive problem, in view of that phosphatic rock are concentration of radionucledes (RN), of a natural series of decay of ^{238}U and of ^{232}Th, and these RNs are distributed among the products and by-products (phosphogypsum) obtained.

Malheiro (2014) corroborating with Cekinski, highlight due to low solubility of the water, the phosphate rock, decreases the disponibility of P_2O_5 in the ground of physical-chemistry treatments for release the phophate present in their composition. In this sense, (Phosphoric acid) and phosphoric acid (Phosphogypsum), according to the reaction described by Oliveira (2012), by attacking with concentrated sulfuric acid in aqueous medium on the phosphate rock (apatite):

$$Ca_{10}(PO_4)_6F_2 + 10H_2SO_4 + 20H_2O \rightarrow 6H_3PO_4 + 10CaSO_4.2H_2O + 2HF$$

Whereas the relation $CaSO_4.xH_2O/P_2O_5$ in order of 5 t/t, Araújo & Fernandes (2013) presumed the production of annuals 170 million tons of phosphogypsum int the world. In Brazil, establishing the reazon of 4,7 t/t, the generated estimated of 5.6 million of tons of this waste for year, with the content of 18–19% of sulfur (S), that represents on the averages of one million tons of sulfur contents in deposited mass (Fernandes et al., 2010).

Phosphogesso or calcium sulfate dihydrate has physical and chemical characteristics that resemble that of natural gypsum, which favors its use in agriculture. The acidification of the phosphate rock is necessary, because, according to Silva & Giulietti (2010) apatite is poorly soluble in water and the availability of phosphorus to plants will be possible as long as the mineral is soluble or solubilized. The absorption of phosphorus by plants becomes possible because it is present in solution in ionic form. Calcium also released is associated with free sulfate generating calcium sulfate, gypsum, which in the presence of phosphates is called phosphogypsum.

In the industries it is observed that after the processing and beneficiation of the phosphate rock, the phosphogypsum produced is deposited in piles near the industrial area. According to Silva (2009) and Russo (2013), the industries that produce phosphoric acid have been concerned with finding alternatives to the reuse of phosphogypsum, since their storage can cause damage to the environment. In this study, the concentrations of heavy metals, metalloids, fluorides and radioactive nuclides vary depending on the impurities present in the matrix phosphate rock (Santos et al., 2006).

Matos (2011) reports that the process of stockpiling of phosphogypsum is always accompanied by high costs to the companies, requiring large areas of stacking and, depending on the price of the land can increase the cost of the disposal, being also necessary the waterproofing of the places of deposit. For Matos (2011) the phosphogypsum disposition can cause environmental impacts such as leaching and surface runoff of toxic elements, SO_4^{2-} and radio in soluble form causing contamination of water resources, release of aerosols in the cells, inhalation of gas Randone (^{222}Rn) and exposure of workers to gamma radiation.

In this sense, aiming at the reuse of this residue, several studies have been developed, such as, for example, its use as fillers for roads and caves (Chang & Mantell, 1990). In addition, in the production of glass and ceramics (Chapman et al., 1999), and in agriculture (Rocha, 1985; Santos, 2001). In this paper, we present the results obtained in this paper.

Melo and Silva (2013) consider important the use of this residue in agriculture, observing a possible reduction in the exploitation of environmental resources, such as natural deposits of plaster and limestone. However, Rufo (2009) and Santos (2002) report that their use in agriculture should be cautious, because in excess can cause assimilation of radionuclides and other elements by plants, as well as radioactive accumulation in the soil or contamination of surface water and groundwater.

In this context, phosphogypsum can be used in agriculture as a soil conditioner, because of its action on the roots of plants and as a source of secondary nutrients of calcium and sulfur. According to Campbell et al. (2006), the soil conditioners improve the quality of the same, increasing the concentration and the availability of the nutrients, still acting in the buffering of the acidity. According to Raij (1988), several factors contribute to the use of gypsum as a soil conditioner, among them its high solubility, which is about 150 times greater than limestone, giving it the same solubility and mobility in the soil solution.

According to Abril et al. (2008), the use of phosphogypsum can improve soil and crop area structures, reduce erosion problems and provide sulfur to plants. Due to its high solubility, it provides calcium to the innermost layers of the soil, reducing the saturation of the aluminum that is toxic to the plants and contributes to the deepening of the root system, which favors more absorption of water and nutrients to the plant.

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In the solution of the soil the phosphogenesis undergoes dissociation, releasing the Ca^{2+} and SO_4^{2-} ions that participate in ionic exchanges:

$$2CaSO_4.2H_2O + H_2O \rightarrow Ca^{2+} + SO_4^{2-} + CaSO_4^{O} + 3H_2O$$

Cation exchange in soil is essential because it allows the soil to retain several elements in forms accessible to plants. According to Carvalho & Raij (1997), the calcium ion (Ca^{2+}) can react in the soil complex, displacing cations such as aluminum (Al^{3+}), potassium (K^{+}) and magnesium (Mg^{2+}) to the soil solution. Reacts with the sulfate anion ($SO4^{2-}$), obtaining a less toxic form of the aluminum for the plants ($AlSO_4^{+}$) and neutral ionic pairs ($K_2SO_4^{O}$, $MgSO_4^{O}$, $CaSO_4^{O}$) that present great mobility along the soil profile.

Rampim et al. (2011), when evaluating the application of different doses of gypsum in wheat and soybean cultivation evidenced an increase in Ca^{2+} levels in all the studied soil layers (0–0.40 m); reduction of Mg^{2+} in the superficial layers and increase of S in all the layers, which promoted drag of cations such as K^{+}, Mg^{2+} and Ca^{2+} contributing to the improvement of subsurface soil conditions, one year after the application of 3.000 kg ha^{-1} of phosphogypsum . The application of gypsum provided an increase of the Ca and Mg foliar contents in the soybean crop and increase in the S content for the soybean and wheat crops, increasing the wheat yield, cultivar CD 104, in soil with exchangeable Al presence.

Araújo (2015) evaluated sugarcane productivity using doses of 0 and 5.000 kg ha^{-1} of gypsum, observed an increase in the yield of stalks and total reducing sugars in sugarcane, raising Ca^{2+}, Mg^{2+} and SO_4^{2-} and reduction in aluminum saturation in the layers of 0.20–1 m, 0.40–1 m, 0–1 m and 0.40–1 m, respectively. The author verified that the application of gypsum provided greater accumulation of organic matter (OM) and higher values of the cation exchange capacity in the 0.40-1 m layer. The use of gypsum also promoted the increase of 5.400 kg ha^{-1} in the total carbon stock (CT) in the soil in the 0-1 m layer, being 4.400 kg ha^{-1} in the 0.40-1m layer.

Pauletti et al. (2014) when associating doses of gypsum and lime in corn, wheat and soybean yields showed that gypsum provided an increase in soil pH from the 0.60 m depth layer at 12.000 kg ha^{-1} of gypsum. The authors verified an increase in Ca^{2+} and S^{2-} concentrations in the subsurface layers and Mg^{2+} leaching. In relation to the evaluated crops, a 39% increase in maize productivity was observed with gypsum application and soybean root system improvement, providing greater resistance when water deficiency was present.

Zandoná et al. (2015) observed an increase in Ca^{2+} levels and redistribution of Mg^{2+} in the 0.10–0.20 m and 0.20–0.40 m layers in the soil, using 8 t ha^{-1} of gypsum with 2 t ha^{-1} of limestone; and decrease in Al^{3+} contents in the 0.20–0.40 m layer. Gypsum increased maize and soybean yield, with a response up to the dose of 2 t ha^{-1}, with increases of 9.3% for maize, and 11.4% and 11.3%, respectively, and without limestone, for soybeans.

Silva et al. (2013) used increasing doses of agricultural gypsum to verify the stability of aggregates and organic carbon in Cerrado Latosol under Coffee cultivation, verifying that the total organic carbon of the soil correlated positively and significantly with the soil aggregation; and that high doses of gypsum, 56 t ha^{-1}, positively altered soil aggregation in the 0.15 m depth layer and that the plaster dose of 7 t ha^{-1} was the best in terms of soil organic carbon at depth of 0.15 m.

In addition to the work that seeks to identify the effects of gypsum in soil solution and its relation with productivity of some crops, we highlight researches related to soil contamination by traces of radionuclides or heavy metals present in phosphogypsum and in phosphate fertilizers. In the work of Bourlegat (2010) the availability of As, Cd, Cr, Co, Cu, Ni, Pb, Zn and Se was evaluated in phosphogypsum samples and superimposed, super triple, MAP and DAP phosphatic fertilizers, it should be noted that the concentrations of these elements are below the limits established by MAPA and CETESB.

Russo (2013) verified the availability of bioavailable radionuclides in samples of phosphogypsum and phosphate fertilizers of national origin, with a low percentage of these elements in solution after mild extraction with EDTA solution, concluding that they would not be available to the environment. Malheiro (2014) determined the availability of ^{238}U and ^{232}Th in soil samples with phosphogypsum by water percolation, whose results demonstrated that the fraction of radionuclides available in the analyzed samples were less than 0.2%. For this author the results indicate that the use of phosphogypsum does not contribute to increase the availability of these elements in the leaching water.

3. Methodology

This is a research centered on the appreciation of perceptible subjectivities in the teaching practice of educators who work in the undergraduate education in the field of a given course. Therefore, we understand that this work is located in the field of qualitative approaches. So, seeking to clarify what is understood as a qualitative reinforcement perspective that favors a broad view of the object studied and the researcher's involvement with the social, political, economic and cultural reality that surrounds him.

As stated by Pais (2001), “in qualitative environments the selection criteria are criteria of understanding, pertinence and not those of statistical representativeness” (p. 110). Thus, we can consider that the qualitative approach is not limited to superficial and limited aspects, but allows to consider and respect the subjectivity of the research subjects.

Thus referenced, the procedure in the structuring of this work obeyed the following order: observation of the reality of a degree course in Education of the field in the areas of Chemistry and Agronomy; identifying the needs of education in this area of training in both disciplines; what type of training could best subsidize education adjusted to the needs of the future educator; what the academics of the fields of Chemistry and agronomy think through the challenge of articulating these knowledge.

In order to reach the proposed objective, two teachers of the mentioned areas were interviewed and they act as teachers in a course of degree in Education of the Field and transcribed the interviews of the same ones with the objective to subsidize the discussion of the work. Still, although this is not a specific challenge of this reflection, it was the reading and discussion of a part of the thesis work of one of the authors of this article with the two academics interviewed, the agronomist and the professor of chemistry, who gave us a basis for edification of this article, built up and sustained in their testimony. In this way, their speeches were observed and they were used fragment of speeches of the same ones where the discourses are present.

To this end, as an orientation, we understand that in observing the discourse one must refuse univocal, easy explanations and the insistent search for the ultimate and hidden meaning of things, since this is quite common and incorrect practice (Fischer, 2001). Therefore, by using discourse one must stay at the level of existence of words and things spoken and it is equivalent to work hard, letting the discourse show itself in its peculiar complexity (Fernandes, 2012).

But for Fischer (2001), to achieve such an undertaking requires the detachment of long and effective learning that generates a look at discourse only as a set of signs and/or signifiers that refer to certain contents, carrying such or that meaning, almost always hidden, disguised, distorted, intentionally distorted, full of real intentions, contents and representations hidden in texts and texts, and not immediately visible.

Fernandes (2012) also affirms that it is as if within the discourse, or in times before him, it was possible to find untouched truths. Thus, it is important to realize that there is nothing behind the curtains of discourse, nor under the floor that is stepped on, what there are statements and relationships that the speech itself puts into operation (Foucault, 2008). So, by using the subject's speech clippings about their needs, challenges, perceptions and learning, both in the field and in the marketing of their products, the search was to perceive the discourse present in these comments and use them as input for this publication and leaving open the possibility of a more detailed and ample work in other moments.

4. Discussion

In view of the above, this brief discussion provides a basis for understandings regarding the influence of phosphogypsum, as a soil conditioner on crops, as an alternative measure to reduce the environmental impacts caused by the mining activity of limestone extraction, as well as the final disposal of this residue after the production of phosphoric acid. On the question the professor of Agronomy made the following observation:

> Another important aspect is to be able to encourage the applicability of this residue in agriculture, as a way to find alternative measures for its reuse, minimizing the effects caused to the environment during its storage. I consider this a powerful argument in the training of teachers who will work in the field.

On the basis of the discussion, it is important to consider that industrial activities are of great importance to develop and developing countries as they not only supply the labor needs of the labor market, but also drive the world economy. In this line of reasoning, the professor of chemistry makes the following placement,

> There is concern about environmental movements and public policies regarding the effects these activities may have on the environment, which vary according to the type of industry, raw materials used, manufactured products, substances produced and discarded, and own production process. I studied that at graduation. Therefore, we understand that this is an important theme and must be present in a process of teacher training for the field.

In this way and taking as reference the extraction of limestone as an industrial activity, we consider that it causes damage to the environment, both in the way it is conducted and in the generation of waste. However, the importance of this activity and the range of applications of the product in industry intensify its exploratory activity in the natural reserves and contribute to the degradation of the areas near the limestone quarries. Among the applications of limestone, it is possible to mention its use in the lime, cement, metallurgy, chemical and paint industries, as well as soil acidity correctives, being agriculture the second largest consumer of limestone in Brazil. In speaking of the question, the consideration made by the academic of Chemistry was as follows,

> "All this understanding already implies the value of such debate for a training of educators in the areas of Chemistry and Agronomy in a process of training educators for the field."

Still, Alcarde (2005) helps us to broaden this issue. For him, soil correctives, such as limestone, are products that neutralize soil acidity and provide essential plant nutrients such as magnesium and calcium. This acidity is characterized by the presence of free hydrogen ions (H+) in the soil solution, resulting from natural organic acids or by the application of nitrogen fertilizers during crop cultivation.

To clarify, acidity is harmful to many crops, as it is a limiting factor in agricultural productivity, reducing the availability of nutrients to the plants, also contributing to the increase of toxic forms of aluminum in the soil (Al^{3+}). Therefore, the application of limestone has a decrease in the concentration of H^+ ions present in the soil, greater availability of nutrients to plants, as well as the supply of Ca^{2+} and Mg^{2+} ions.

Broadening the issue, the teacher with a background in agronomy believes that, although the use of limestone is constant in agricultural practices, there is a rethinking of the agricultural society about its use in agriculture and the impacts caused to the environment by its exploitation, a matter very pertinent to a discussion in a degree within the areas mentioned here. Proof of the importance of the debate is that the use of alternative materials or in association with limestone, which contribute to the reduction of acidity and nutrient supply to the soil have been sought.

Therefore, according to the academic, among the studied materials, phosphogypsum or agricultural gypsum has gained importance in the agricultural scenario in the last decades.

In order to better understand the issues surrounding phosphogypsum, it is a byproduct generated from the acidification of phosphate rock apatite with sulfuric acid (H_2SO_4), during the production of phosphoric acid — H_3PO_4, used later to obtain phosphate fertilizers. This residue, according to Canut (2005), presents physical and chemical properties similar to natural gypsum (calcium sulfate dihydrate). According to Raij (1988), its chemical composition presents average contents of 17.7% of sulfur (S), 30.9% of calcium oxide (CaO), 0.2% of fluorine (F) and 0.7% of phosphorus (P_2O_5), belonging to class II B in the classification of waste, i.e., non-hazardous and inert (Luz, 2005).

The problem around this residue is centered in its production (4.8 tons of residues per ton of H_3PO_4 produced) and in the storage, which is usually packed in piles exposed to the atmosphere in the plants. In relation to its disposal, the main effects caused to the environment are evidenced by the leaching of sulfates, fluorides, heavy metals and radionuclides to the soil and subsoil, contaminating underground reservoirs; direct capture of heavy metals and radionuclides by plants; contamination of humans and animals by the emission of gamma radiation from phosphogypsum piles; among others.

In this context, Araújo & Fernandes (2013) point out that some H_3PO_4 producing industries, such as Vale Fertilizantes, have been concerned with the environmental impacts caused by the deposition of waste into the environment, however, Brazilian legislation is still flawed for this type of waste. Therefore, it is necessary to find an alternative to reuse it, whether in construction, road paving or agricultural activities.

> Again, we know that such knowledge is important in the field of chemistry because, in agriculture, phosphogypsum is used as a source of calcium and sulfur for several crops, in addition to contributing to the slight increase in soil pH in *cerrado* regions, where acidity potential is low.

Still, the educator in Chemistry reinforce that,

> In addition to the theoretical discussion, we consider that the large number of settlements where Brazilian family[3] agriculture is based is the cerrado region.

Taking up the question of calcium, it promotes the deepening of the root system, which allows greater absorption of water and nutrients by plants. In relation to the increase in soil pH, the same occurs by the exchange of sulfate ions (SO42-) with hydroxyls (OH-) on the surfaces of aluminum and iron oxides. In relation to the solubility of phosphogypsum and limestone in soil (calcium and magnesium carbonate), phosphogypsum is 22.7 times more soluble than magnesium carbonate and 172 times higher than calcium carbonate, an important factor to be (Borkert et al., 1987). In this study, the use of the product in the soil was used to satisfy the calcium requirements of the crops.

Facing this context, it is noted that discussing phosphogypsum in a graduation, working together between the areas of Chemistry and Agronomy, can potentiate such debate. For this, it is enough that it is thought as a resource to be used in agriculture as a soil conditioner, providing nutrients to the plants, reducing the potential acidity of the soil and promoting greater water resistance to the crops, besides being an alternative path for the final disposal of this waste today. In this path of reasoning, even if such practice is not well accepted in family agriculture - Agroecology, let us consider that such knowledge subsidizes a broad knowledge to the future educator and the reference in the best understanding of the reality of the field within its contents systematized in the process of formation.

5. Some Considerations on the Question

Regarding the main contributions that such a proposal could bring, we believe that it could stimulate the initial formation of teachers to the field through the development of curricular and extracurricular activities, dialogue and closer relations between university, school and peasants.

Therefore, the challenge is for the work to strengthen the plurality of cultural traditions, citizenship and commitment to improving the quality of the rural community through the training provided by the knowledge of Chemistry and Agronomy. Our aim is that it is possible to preserve the official knowledge and, in addition, it is possible to reach the extension of the approaches of Chemistry and Agronomy in the Degree of the Field, hoping thus, to confirm that the scientist can present the appropriate contextualization, for the teaching, contributing to the learning of the areas involved.

Therefore, we can consider that using the teaching of Chemistry and Agronomy to provide theoretical, practical and contextualized subsidies to the students of the Field Education course, seems to us something to consider. Still, we understand how important it is that such procedures are focused on the importance of ecology and the development of activities to improve the reality of the field.

[3] Family farming includes all family-based agricultural activities and is linked to several areas of rural development. Family farming is a means of organizing agricultural, forestry, fishery, pastoral and aquaculture production that are managed and operated by a family and predominantly dependent on family labor for both women and men (FAO, 2014).

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