

Human Values as Predictors of Agroecological Beliefs

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ABSTRACT – Agroecology is indicated by the Food and Agriculture Organization of the United Nations - FAO as a solution to the realization of the human right to food. This study investigated the relationship between human values and beliefs about Agroecology. A survey was answered by students and researchers in the agricultural sciences ($n=388$). Two models were tested with path analysis. The results revealed that values of Self-Transcendence (0.24) and Openness to Change (0.21) were positive predictors of proagroecology beliefs. These findings point to the importance of activating these values in the training of professionals prepared for the challenge of working towards sustainable agro-food systems.

KEYWORDS: agroecology, psychometry, agriculture, beliefs, values

Valores Humanos como Preditores de Crenças Agroecológicas

RESUMO – A Agroecologia é indicada pela Organização das Nações Unidas para a Alimentação e a Agricultura (FAO) como uma solução na concretização do direito humano à alimentação. Este estudo investigou a relação entre valores humanos e crenças sobre Agroecologia. Um *survey* foi respondido por estudantes e pesquisadores das ciências agrárias ($n=388$). Dois modelos foram testados com análise de trilhas. Os resultados revelaram que valores de Autotranscendência (0,24) e de Abertura à Mudança (0,21) foram preditores positivos de crenças a favor da Agroecologia. O estudo aponta para a importância da ativação destes valores na formação de profissionais preparados para o desafio de trabalhar em prol de sistemas agroalimentares sustentáveis.

PALAVRAS-CHAVE: agroecologia, psicometria, agricultura, crenças, valores

INTRODUCTION

Agroecology is indicated by the Food and Agriculture Organization of the United Nations (FAO) as being a solution in the realization of the human right to food. However, myths and beliefs about agroecology are frequent (Canuto, 2011). In general, they reveal an apparent paradox between the need for large-scale food production, supported by modern agriculture, and the reduction of social, health and environmental impacts of this production (Pant, 2016).

Agroecology is considered a science, a political movement and a social practice (*Associação Brasileira de Agroecologia* [ABA], 2015; Martin & Isaac, 2018). As a science, it reveals its transdisciplinary character, which respects, incorporates and re-elaborates the traditional

knowledge of populations, using ecology as an integrating science. As a political movement, it highlights its adoption by social movements that fight for autonomy and self-sufficiency, for the redistribution of land and against the destruction caused by industrial agriculture. And finally, as a social practice, it recognizes that the development of agroecosystems took place through interaction between social and ecological systems, through co-evolution and interaction for centuries between society and the environment.

This new concept of agriculture underlies new values, associated with the ecological crisis and sustainability (Aubin et al., 2019; Martin & Isaac, 2018). Despite the

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growing international debate, in Brazil, studies on values and beliefs associated with agroecology are rare, pointing to a gap to be explored. This article investigated the influence of personal values on the agroecological beliefs of professionals and students in the agricultural sciences.

Values and agroecological beliefs

In the last decades, environmental issues have aroused the interest of researchers from the most different areas. Based on the theoretical model of Values-Beliefs-Norms (Stern et al., 1995; Stern et al., 1999), studies revealed that values and beliefs influence pro-environmental attitudes and behaviors (Bouman et al., 2018; Chen, 2015; De Dominicis et al., 2017) and constitute key concepts for understanding environmental issues and the search for sustainability.

The model Values-Beliefs-Norm (VBN) presents a causal relationship between values, the belief system and moral and social norms, which influence the intention of pro-environmental behavior and, consequently, pro-environmental behavior. For these authors, the norms must be activated by specific beliefs related to environmental issues and attitudes flow from human values, information about the objects of attitudes, and social interactions, which, in turn, influence these beliefs in formation.

According to Schwartz (2012), values are conceived as abstract principles, which guide people's lives, organized in order of importance, where the dynamics of the structure predicts that individuals with high priority for compatible types of values have low priority for conflicting types.

Schwartz's refined theory of basic human values indicates two bipolar dimensions of motivational incompatibility between higher-order values (Self-Transcendence versus Self-Enhancement and Openness to Change versus Conservation), where 19 values are grouped. Also called four second-order motivational types, they are the same existing in the original theory (Torres et al., 2016).

Schwartz et al. (2012), attribute to the refined theory a greater predictive capacity than the original theory and with better discrimination between the fundamentals of values and beliefs. In this refinement, more ecological values such as Universalism (Bouman et al., 2018; Broek et al., 2017) have been reorganized into three types: Universalism - Nature, Universalism - tolerance and Universalism - concern.

On the other hand, beliefs are more specific than values and relate to the attitudinal object. In the environmental context, they are generally studied as the cognitive dimension of environmental attitudes (Fishbein & Ajzen, 1975) and represent "opinions, thoughts or knowledge about the attitude object" (Hernández & Hidalgo, 2000, p. 310). In this line of investigation, studies have shown that environmental values and beliefs influence the adoption of sustainable lifestyles and environmental concerns (Axon, 2017; Corral-Verdugo & Guedea, 2011; Schultz et al., 2014).

Given this viewpoint, agroecological beliefs are defined as statements about the object of attitude Agroecology, which can be represented in the form of propositions that link the object of attitude to some other entity, through a verb or other relational term expressing association or disjunction. This other entity is often expressed in an adjective way.

Therefore, agroecological beliefs can be characterized into two types: positive or negative. The first, supporting this conception of food production, can be defined as proagroecological beliefs. Such beliefs can be exemplified as "Agroecology can increase agricultural productivity". In contrast, beliefs of the negative type, represent a conception contrary to this type of production, which can be defined as antiagroecological beliefs. An example would be the following statement: "Agroecology is less productive".

Whereas proagroecological beliefs can be identified with a new concept of agriculture, aligned with environmental concerns, antiagroecological beliefs can be associated with myths about this type of agricultural production. Canuto (2011) listed some of them, such as, agroecological systems are technologically backward, of low productivity, economically unfeasible, labor intensive and "purely ideological".

Taking into account the relationship between values, attitudes, and behavioral decisions as well as that the constant interaction with people who have different values priorities can change a person's beliefs about the world and vice versa, according to Rohan (2000), investigating the relationship between personal values and agroecological beliefs can contribute to the understanding of agricultural models taught and practiced by professionals in the agricultural sciences.

The present study

The main reason that gave rise to this study was the empirical verification of the different beliefs about Agroecology of professionals related to agrarian sciences, mainly those related to education, for their work in guiding new generations of professionals in these areas. The education of these new generations is based on a belief system, which relates to an agricultural model. Despite the proposals for the adoption of Agroecology by institutions such as FAO (Schutter, 2012) and Latin American Society of Agroecology (SOCLA) (Third World Network [TWN] & Sociedad Científica Latinoamericana de Agroecología [SOCLA], 2015), the majority of Brazilian higher education courses, in the area of agrarian sciences, mainly in Agronomy, do not have an agroecological focus, as stated by Jacob (2016).

According to Beus et al. (1990), there are two paradigms regarding agriculture: that of conventional agriculture and that of alternative agriculture (where Agroecology is included). For the authors, it is not possible to separate the

practices and technologies that make up agriculture from the beliefs and values underlying it.

Assuming that teachers transmit their systems of values and beliefs in the teaching and learning processes, it was considered important to understand what the beliefs that teachers and students of agrarian sciences have about agroecology are, as well as their relationship with values. Therefore, based on the VBN theoretical model (Stern et al., 1993; Stern et al., 1995; Stern, 2000) and on the theoretical model of values by Schwartz et al. (2012) it would be possible to understand the consequences for education, society and the environment on the way of conducting this agricultural production.

Based on these premises, Agroecology was considered a new object of attitude, which has a dimension of environmental concern and, therefore, can also be related to factors such as age, education and gender. Studies point out, for example, that demographic variables influence environmental concern differently, depending on the phenomenon and the socio-cultural context (Royne et al., 2016; Saphores et al., 2012; Xiao & McCright, 2015).

According to Stern et al. (1995), before Carson (2010) wrote her book "Silent Spring", denouncing the risks of pesticides to life and the environment, there were few attitudes against the effects of pesticides. This way, if attitudes towards Agroecology can flow from human values, information and social interactions, which influence the beliefs about it, especially because it is an emerging concept and full of associated myths, it is considered important to understand more about the influence of human values on agroecological beliefs.

For this purpose, two models were tested, with the basic human values of Schwartz's refined theory of values as independent variables (IV) and Agroecological beliefs as dependent variables (DV). In addition, sociodemographic and control variables on agroecological beliefs were also tested.

Model 1: The agroecological beliefs of the four factors: Factor 1 - Sociopolitical Dimension, Factor

2 - Socioeconomic and Cultural Dimension, Factor 3 - Environmental Dimension and Factor 4 - Technical-agronomic Dimension such as DV's and 5 motivational types of values, Universalism - Nature, Universalism - tolerance, Power - Resources, Power - dominance, and Benevolence - caring as independent variables (IV's).

Model 2: The agroecological beliefs of the four factors: Factor 1 - Sociopolitical Dimension, Factor 2 - Socioeconomic and Cultural Dimension, Factor 3 - Environmental Dimension and Factor 4 - Technical-agronomic Dimension such as DV's and 4 higher-order values, Self-Transcendence, Openness to Change, Self-Enhancement, and Conservation as IV's.

These IV's were chosen based on studies that point out the relationship between values with ecological behavior. According to Schultz et al. (2005), the values of Self-Transcendence, especially those of Universalism, and the values of Openness to Change positively influence ecological attitudes and behaviors, while the values of Self-Enhancement and Conservation influence negatively. In a Brazilian study, Coelho et al. (2006) revealed that the values of Self-Transcendence, specifically those of universalist orientation, were predictors of pro-environmental attitudes and behaviors.

Therefore, the hypotheses tested were as follows:

Hypothesis 1: The values of Universalism - Nature, Universalism - tolerance and Benevolence - caring will be positive predictors of proagroecological beliefs.

Hypothesis 2: The values of Power - dominance and Power - Resources will be positive predictors of antiagroecological beliefs.

Hypothesis 3: The values of Openness to Change and Self-Transcendence will be positive predictors of proagroecological beliefs.

Hypothesis 4: Age, gender, sustainable agriculture practice and education level will be predictors of agroecological beliefs, so that older people, women, practitioners of sustainable agriculture and those with higher education levels will be more proagroecological.

METHOD

Sample

The sample consisted of 388 people, with an age range of 19-73 years. The mean age was 36.94 years ($SD = 13.46$), 222 men and 166 women. They identified themselves in the following categories: students (149), teachers (100), researchers (46), farmers (19), extension workers (25), and others (49).

As for the education level, 113 individuals had incomplete undergraduate, 34 undergraduate, and 241

had undergraduate and graduate. The most frequent undergraduate course was Agronomy.

Instruments

To test the theoretical models presented, two instruments were used: the Schwartz value scale (PVQ-RR) and the Brazilian Agroecological Beliefs Scale, with the addition of sociodemographic variables. Such instruments are presented below.

Scale of values of the refined theory of Schwartz (PVQ-RR)

The PVQ-RR was used to measure the 19 values of the refined theory (Schwartz, 2017; Torres et al., 2016). It is composed of 57 items with a brief description of different people, each one with goals, aspirations or desires implicitly related to the highlighted values. For each of the 19 values there are 3 items on the scale to measure it. A version with a 5-point Likert scale was used, keeping the extreme points as anchors (1 = *It doesn't look like me at all*; 5 = *It looks a lot like me*).

Brazilian Agroecological Beliefs Scale (BABS)

BABS was used to measure agroecological beliefs. It is composed of 53 statements about Agroecology, arranged in four factors: Factor 1 - Sociopolitical Dimension ($\alpha = 0.71$), Factor 2 - Socioeconomic and Cultural Dimension ($\alpha = 0.77$), Factor 3 - Environmental Dimension ($\alpha = 0.65$), and Factor 4 - Technical-agronomic Dimension ($\alpha = 0.71$). Factors 1 and 3 correspond to proagroecological beliefs and factors 2 and 4 to antiagroecological beliefs (Fiamoncini, 2018). The measure uses a 5-point Likert scale (1 to 5), where 1 means *strongly disagree* and 5 means *strongly agree*.

At the end, the sociodemographic and control variables were included: age, gender, education level and the practice or not of sustainable agriculture.

Procedures

The sample was recruited by e-mail sent to the coordinators of the Undergraduate and Graduate Courses in Agronomy, Agroecology and other Agrarian Sciences courses from public (Universities and Federal Institutes) and private higher education institutions, in the five Brazilian regions. Such courses were sought in the E-mec system, through the website <http://emec.mec.gov.br/>. A total of 18 institutions and 40 courses, from the five Brazilian regions, replied to the emails. National Articulation of Agroecology (ANA) and Brazilian Association of Agroecology (ABA) also forwarded the link to their members. The link to the instruments applied was hosted online, from December 1, 2016 to May 31, 2017, using the SurveyMonkey service website. The research link was also published on the social network Facebook, in Agroecology Nucleus and groups related to agrarian sciences, at the same time interval.

The participants answered the questionnaire, voluntarily and anonymously, being informed about the nature of the participation, the guarantee of confidentiality and anonymity, as well as the possibility of withdrawing without any prejudice. This was considered enough as a free and clarified consent term because the research was aimed at undergraduate students or above, professors of

higher education and researchers in areas such as agrarian sciences, agroecology and the like, who are able to evaluate possible risks and make decisions with relative autonomy. No incentives for participation were given to respondents.

Data Analysis

Scale of values of the refined theory of Schwartz (PVQ-RR)

Initially, treatment of missing and outliers was carried out. Subsequently, in order to confirm the theoretical structure of the values, confirmatory factor analyses were carried out.

Confirmatory Factor Analysis (CFAs)

Separate CFAs were performed for each of the four types of higher-order values, as proposed by Cieciuch and Schwartz (2012). Three multiple fit indices were used to determine the acceptability of the models: the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMS). The values of CFI > 0.90 (Bentler, 1990), RMSEA < 0.08 (Marsh, Hau, & Wen, 2004) and SRMR < 0.08 (Marsh et al., 2004) were considered good adjustment indicators. Such analyzes were made with the program R, version 3.4.2, Package *lavaan* (*latent variable analysis*).

The estimation method used was that of Maximum Likelihood Robust (MLR). In order to achieve identification, the variance of the latent factors was fixed at 1 in the item that had the greatest factor load, among the three of each of the 19 values.

Brazilian Agroecological Beliefs Scale (BABS)

For the test of the two theoretical models, the factor scores of the four dimensions found in the exploratory factor analysis performed on the BABS were used.

Sociodemographic variables

Initially, the frequencies of each variable were calculated using the SPSS software, version 21. In order to perform the statistical calculations for Theoretical Models 1 and 2, 0 or 1 were used for gender (0 = female, 1 = male) and for practice sustainable agriculture (0 = not practicing and 1 = practicing). Regarding the education level, the categorization used in data collection was organized (1 for incomplete undergraduate, 2 for complete undergraduate without graduate and 3 for graduate) in two groups, where 0 = incomplete undergraduate course with addition of complete undergraduate without graduate and 1 = complete undergraduate course with graduate. Regarding age, absolute values were used for the analyzes.

Testing of theoretical models through Path Analysis

In order to test the two theoretical models of the relationship between values and agroecological beliefs, two Path Analysis were carried out with the Program R, version 3.4.2 and Package *lavaan*. Path Analysis measures the influence of one variable on the others, regardless of the others, where the correlations between the characters are broken down into direct and indirect effects (Souza, 2013).

Confirmatory Factor Analysis (CFAs)

The adjustment coefficients obtained for Self-Transcendence were $\chi^2 / g.l = 2.18$, SRMR = 0.065, CFI = 0.91 and RMSEA = .065. For Openness to Change $\chi^2 / g.l = 2.03$, SRMR = 0.053, CFI = .94 and RMSEA = .062. For Self-Enhancement $\chi^2 / g.l = 1.90$, SRMR = .054, CFI = 0.93 and RMSEA = .073. And for Conservation $\chi^2 / g.l = 1.83$, SRMR = .049, CFI = .94 and RMSEA = .054. The model fit was considered good, according to the indexes and all items were maintained. The motivational type Humility was better suited to the higher-order type Self-Transcendence than to Conservation in this sample.

Testing of theoretical models through Path Analysis

Table 1 presents the significant direct effects found in Model 1. Factor 1 (CA1) of proagroecological beliefs: Sociopolitical Dimension – a significant coefficient of 0.555 was found for the effect of the Universalism - Nature values on these beliefs, indicating that people who have higher values of this type also have greater beliefs of this dimension. In turn, a significant coefficient of -0.231 was found for the effect of the Power - Resources values, indicating that people who have lower values of this type have more beliefs of this dimension. There was also a significant coefficient of -0.170 for the gender effect, indicating that women have more beliefs in the Sociopolitical Dimension than men. Finally, a significant coefficient of 0.009 was found for the effect of age, indicating that the older, the more agroecological beliefs of a socio-political nature. For Factor 2 of antiagroecological beliefs (CA2): Socioeconomic and Cultural Dimension – a significant coefficient of 0.410 was found for the effect of the Power - Resources value on these beliefs, indicating that people who have higher values of this type have more beliefs of this dimension. A significant coefficient of 0.216 was also obtained for the gender effect, indicating that men have more beliefs of this type than women. Regarding Factor 3 (CA3) of proagroecological beliefs: Environmental Dimension – a significant coefficient of 0.207 was found for the effect of the Universalism - Nature value on these beliefs, indicating that people who have higher values of this type also have

The estimation method used was that of Maximum Likelihood Robust (MLR), according to Li (2016). The factor scores of the variables were used, which reduces the biases and sources of error of the simple correlations. Factor scores are calculated by averaging the product of the score obtained on a variable versus the weights of the factor scores resulting from the CFAs. Only items kept after CFAs were used (Herrmann & Pfister, 2013).

RESULTS

more beliefs of this dimension. There was also a significant coefficient of -0.081 for the gender effect, indicating that women have more beliefs in the Environmental Dimension than men. Finally, for Factor 4 of antiagroecological beliefs (CA4): Technical-agronomic Dimension – a significant coefficient of -0.408 was found for the effect of the value of Universalism - Nature on these beliefs, indicating that people who have lower values of this type have more beliefs of this dimension. In turn, a significant coefficient of 0.221 was found for the effect of the Power - Resources value, indicating that people who have higher values of this type have more beliefs of this dimension.

These results partially corroborate Hypothesis 1, since only the Universalism - Nature value was a positive predictor of beliefs supporting Agroecology (Sociopolitical Dimension and Environmental Dimension), in addition to a negative predictor of antiagroecological beliefs (Technical-agronomic Dimension). Equally, hypothesis 2 was also partially corroborated, once only the Power - Resources value was a predictor of beliefs contrary to Agroecology (Socioeconomic and Cultural Dimension and Technical-agronomic Dimension), in addition to negatively predicting the proagroecological beliefs of the Sociopolitical Dimension. The same way, hypothesis 4 was also partially corroborated, since only gender and age were predictors of beliefs. Gender was a positive predictor of the anti-agroecological beliefs of the Socioeconomic and Cultural Dimension, indicating that men have more such beliefs. On the other hand, gender was a negative predictor of proagroecological beliefs of the Sociopolitical Dimension and the Environmental Dimension, indicating that women have more such beliefs. In addition, age was a positive predictor of the proagroecological beliefs of the Sociopolitical Dimension, so that, the older, the more beliefs in the affirmations of this dimension.

Regarding Model 2 test, Table 2 presents the direct effects found in it. Factor 1 of proagroecological beliefs (CA1): Sociopolitical Dimension – a significant coefficient of 0.209 was found for the effect of the higher-order value Openness to Change on these beliefs, indicating that people who have higher values of this type have more beliefs of

this dimension. In turn, a significant coefficient of -0.236 was obtained for the effect of the higher-order value Self-Enhancement, indicating that people who have lower values of this type have more beliefs of this dimension. A significant coefficient of -0.191 for the gender effect was also found, indicating that women have more socio-political beliefs than men. In addition, a significant coefficient of 0.015 was found for the effect of age, revealing that the older, the more beliefs in these statements. For Factor 2 of anti-agroecological beliefs (CA2): Socioeconomic and Cultural Dimension – a significant coefficient of -0.322 was found for the effect of the higher-order value Self-Transcendence and a significant coefficient of 0.323 for the effect of the

higher-order value Self-Enhancement, indicating that people who have lower values of Self-Transcendence and higher values of Self-Enhancement have more beliefs of this dimension. A coefficient of 0.228 was also found for the gender effect, indicating that men have more beliefs than women in these statements. Regarding Factor 3 of the proagroecological beliefs (CA3): Environmental Dimension – a coefficient of 0.238 was found for the higher-order value Self-Transcendence and -0.069 for the higher-order value Self-Enhancement, indicating that people who have higher values for Self-Transcendence and lower values of Self-Enhancement have more beliefs of this dimension. A coefficient of -0.09 for the gender effect was also obtained,

Table 1
Results of Model 1

Direct effects	Path	Coefficient	SE	95% CI		p(> z)
				CI lower	CI upper	
Universalism - Nature on CA1	a2	0.555	0.093	0.372	0.737	0.000
Power - Resources on CA1	a5	-0.231	0.086	-0.400	-0.062	0.007
Gender on CA1	b1	-0.170	0.078	-0.323	-0.018	0.028
Age on CA1	b13	0.009	0.004	0.002	0.017	0.014
Power – Resources on CA2	a10	0.410	0.093	0.228	0.593	0.000
Gender on CA2	b4	0.216	0.076	0.067	0.366	0,005
Universalism - Nature on CA3	a12	0.207	0.054	0.100	0.313	0.000
Gender on CA3	b7	-0.081	0.039	-0.158	-0.005	0,038
Universalism - Nature on CA4	a17	-0.408	0.105	-0.615	-0.202	0.000
Power – Resources on CA4	a20	0.221	0.091	0.044	0.399	0.015

Note: CA1 = Sociopolitical Dimension, CA2 = Socioeconomic and Cultural Dimension, CA3 = Environmental Dimension, CA4 = Technical-agronomic Dimension, SE = standard error, CI = confidence interval, p(>|z|) = significance level.

Table 2
Results of Model 2

Direct effects	Path	Coefficient	SE	95% CI		p(> z)
				CI.lower	CI.upper	
Openness to Change on CA1	a1	0.209	0.086	0.040	0.378	0.015
Self-Enhancement on CA1	a3	-0.236	0.067	-0.367	-0.104	0.000
Gender on CA1	b1	-0.191	0.082	-0.351	-0.031	0.020
Age on CA1	b13	0.015	0.004	0.008	0.023	0.000
Self-Transcendence on CA2	a6	-0.322	0.133	-0.582	-0.061	0.015
Self-Enhancement on CA2	a7	0.323	0.064	0.197	0.450	0.000
Gender on CA2	b4	0.228	0.078	0.076	0.380	0.003
Self-Transcendence on CA3	a10	0.238	0.072	0.097	0.378	0.001
Self-Enhancement on CA3	a11	-0.069	0.035	-0.138	0.000	0.049
Gender on CA3	b7	-0.090	0.040	-0.169	-0.011	0.025
Openness to Change on CA4	a13	-0.198	0.092	-0.379	-0.018	0.031
Self-Enhancement on CA4	a15	0.311	0.071	0.173	0.449	0.000

Note: CA1 = Sociopolitical Dimension, CA2 = Socioeconomic and Cultural Dimension, CA3 = Environmental Dimension, CA4 = Technical-agronomic Dimension, SE = standard error, CI = confidence interval, p(>|z|) = significance level.

indicating that women have more beliefs in these statements than men. Finally, for Factor 4 of antiagroecological beliefs (CA4): Technical-agronomic Dimension – a coefficient of -0.198 was found for the higher-order value Openness to Change and 0.311 for the higher-order value Self-Enhancement, indicating that people who have lower values of Openness to Change and higher Self-Enhancement have more beliefs of this dimension.

Given these results, hypothesis 3 was partially corroborated. Openness to Change was a positive predictor

of Factor 1 of proagroecological beliefs, and a negative predictor of Factor 4 of antiagroecological beliefs; Self-Transcendence was a negative predictor of Factor 2 of antiagroecological beliefs, and a positive predictor of Factor 3 of proagroecological beliefs; Self-Enhancement was a predictor of the 4 Factors of agroecological beliefs, being a negative predictor of Factors 1 and 3 (proagroecological beliefs), and a positive predictor of Factors 2 and 4 (antiagroecological beliefs). As in Model 1 shown above, in relation to Hypothesis 4, the results found were the same.

DISCUSSION

Two models were tested to evaluate the relationship between basic human values and agroecological beliefs aiming to verify whether the values would have any predictive influence on them. For that, PVQ-RR and BABS were applied to a sample of students, teachers and researchers from agrarian sciences field. First of all, four confirmatory factor analyzes were performed, one for each higher-order value of the Schwartz scale values. Additionally, an exploratory factor analysis of BABS was carried out. Afterwards, two path analyzes were performed to verify the tested models.

Overall, all confirmatory factor analyzes - CFAs had good fit indexes, and the Humility value adjusted better within the Self-Transcendence higher-order value. As proposed by Schwartz's theory, Humility is borderline between Self-Transcendence and Conservation and, for this sample, the recognition of the insignificance itself (central goal of the Humility value) apparently reflects more the conformity with social expectations. This finding is in line with the results of Torres et al. (2016).

On the other hand, the results of the path analysis showed that some values, both first and higher-order, were predictors of agroecological beliefs in a different way.

Discussion of Model I results

Universalism - Nature and Power - Resources, which are in an antagonistic position in Schwartz's motivational continuum, had different effects on three of the four belief factors.

The Universalism - Nature value had a direct positive effect, with a coefficient of 0.555 on CA1 proagroecological beliefs and 0.207 on CA3 proagroecological beliefs, being a predictor of beliefs supporting Agroecology, by the Sociopolitical and Environmental Dimensions, respectively. On its turn, it had a direct negative effect, with a coefficient of -0.408, being a predictor of the anti-agroecological beliefs of the Technical-agronomic Dimension (CA4). These results corroborate the values of alternative agriculture (where Agroecology is inserted), as identified by Beus and Dunlap (1990), which would be related to environmental

and ethical sustainability. It was expected that the value of Universalism - Nature would be a positive predictor of proagroecological beliefs CA1 and CA3, since concerns about the preservation of Nature are part of these two dimensions. Moreover, proagroecological beliefs are related to the harmony of the society-Nature relationship. These beliefs stand out for being associated with the call for the urgent change in agriculture, so that it becomes ecologically correct, for the rigorous conservation of soil and water, with the long-term protection of the productive capacity of the land, with the concern for future generations, with the connection between food production and people's right to food, with the strengthening of small rural communities and with the acceptance of socio-cultural biodiversity to generate local development processes.

On the other hand, the fact that Universalism - Nature had a direct negative effect on the anti-agroecological beliefs of the Technical-agronomic Dimension makes sense, despite not being part of the formulated hypotheses. The beliefs of this dimension, contrary to Agroecology, can also be considered contrary to the protection of Nature, being opposed to what the values of Universalism - Nature express, such as the belief in the use of pesticides, transgenics and chemical fertilizers, among others.

At the same time, the Power - Resources value had a direct positive effect on the Socioeconomic and Cultural and Technical-agronomic Dimensions of antiagroecological beliefs, respectively with a higher coefficient on CA2 beliefs (0.410) and lower on CA4 beliefs (0.221). It also had a negative direct effect on the proagroecological beliefs of the Sociopolitical Dimension, with a -0.231 coefficient on CA1 beliefs, lower than the Universalism - Nature value. These findings are consistent with the values on conventional agriculture identified by Beus and Dunlap (1990), which would be related to the intensification and maximization of profit. Since the Power - Resources value deals with the power exercised through the control of material and social resources, it was expected that it would have an influence on beliefs contrary to Agroecology, related to obtaining profit and greater productive efficiency, despite concerning environmental factors, such as the adequate use of soil

and water, without taking into account environmental externalities, the costs of which are passed on to society. Moreover, they are beliefs that do not consider the ecological functioning of Nature and point to the use of chemical, pesticide and transgenic fertilizers as the only ones that can solve the humanity's food issue.

Given these points, it is believed that it is only possible to produce on a macro scale, carried out through concentrating, capital-intensive, monocultivator ventures, which do not take into account the human and natural resources that define the structure and function of agro-ecosystems. The fact that Power - Resources had a negative influence on the proagroecological beliefs of the Sociopolitical Dimension was also not foreseen in the formulated hypotheses, although it makes sense. This is due to the fact that there are beliefs in this dimension, such as leveling the historically produced inequalities, strengthening small rural communities, accepting socio-cultural biodiversity and imitating natural ecosystems as one of the secrets to the success of agriculture, which are contrary to the power over material and social resources. In addition, this occurrence of a direct opposite effect is explained by the conflicts of values predicted by Schwartz's theory in the circular motivational continuum, where Power - Resources is opposite to Universalism - Nature (Schwartz et al., 2012).

In any case, the coefficients found in Model 1, for the most part, have low indices, below 0.400. Such indices may reveal that other factors may influence agroecological beliefs or that it is necessary to better understand the Agroecology construct and the myths associated with it. Indexes considered average were found only in relation to the type of value Universalism - Nature over beliefs CA1 and CA4, of 0.555 and -0.408, respectively, and the type of value Power- Resources over beliefs CA2, with 0.410. Such indices reinforce the continuous-motivational of Schwartz's theory and the greater influence of these values on agroecological beliefs in the Dimensions that involve social and environmental issues.

Regarding the sociodemographic variables, only gender and age showed some predictive power. Women had more proagroecological beliefs, while men had more antiagroecological beliefs. Gender, therefore, was a negative predictor of both the Sociopolitical Dimension and the Environmental Dimension, with respective coefficients of -0.191 and -0.09, and positive predictor of antiagroecological beliefs of the Socioeconomic and Cultural Dimension, with a coefficient of 0.228. At the same time, older people have more proagroecological beliefs in the socio-political dimension, with a coefficient of 0.015.

The fact that women have more proagroecological beliefs is corroborated by Cheung, Luke and Maio (2014) in their research on climate change. Consultant women had significantly higher scores on beliefs about anthropogenic climate change than men.

These findings are also supported by studies referring to values, which have shown that women have more self-transcendence values, with a more social focus, while men have more self-enhancement values, with a personal focus, regardless of whether the environmental issue is being discussed. (Feather, 2004; Schwartz & Rubel, 2005).

However, the indices found in the present study were very modest, with coefficients of -0.170, 0.216, -0.081 in Model 1, in relation to beliefs CA1, CA2 and CA3, respectively, and -0.191, 0.228, -0.09 in Model 2, in relation to beliefs CA1, CA2 and CA3, respectively. Such values explain very little of the observed variability.

The fact that women have more proagroecological beliefs may be linked to their gender roles, centered on issues of reproduction and care. Siliprandi (2009) found that, in part, the valuation attributed to women to aspects of the relationships between human beings and Nature is linked to the fact that they have a role within the productive structure, as caregivers of people and other beings, taking care food and health, which is not the case among men.

This way, gender assignments could explain the fact that the women in the present study, students and teachers of agrarian sciences, demonstrate more favorable beliefs for the preservation of the environment and the production of healthy food. The same way, it can explain why men have beliefs more related to profit making and productive efficiency, issues related to their gender role, as provider of the home. Future studies could be carried out on feminism and agriculture, gender roles, and so on, since they go beyond the scope of the present work.

Regarding age, there was only a positive influence on the proagroecological beliefs of the Sociopolitical Dimension, indicating that older people have more agroecological beliefs in the dimension, which is characterized by social and political concerns supporting Agroecology. The fact that age has been a positive predictor of social and political concerns may be explained by the fact that, with the passage of time, more maturity, experience and knowledge are acquired. In any case, the correlation index presented was very modest, with a coefficient of 0.009 in Model 1 and .015 in Model 2 and was only manifested in relation to the Sociopolitical Dimension. The level of education and the practice of sustainable agriculture did not indicate significant influences as predictors of agroecological beliefs.

Discussion of the results of Model 2

The higher-order values Self-Transcendence, Self-Enhancement, and Openness to Change were predictors of agroecological beliefs in a different way. Self-Transcendence was a positive predictor of proagroecological beliefs in the Environmental Dimension, with a coefficient of 0.238, and a negative predictor of anti-agroecological beliefs in the

Socioeconomic and Cultural Dimension, with a coefficient of -0.322. In turn, Self-Enhancement was a positive predictor of the anti-agroecological beliefs of the Socioeconomic and Cultural and Technical-agronomic Dimensions, with coefficients of 0.323 and 0.311, respectively, and a negative predictor of the proagroecological beliefs of the Sociopolitical and Environmental Dimensions, with coefficients of -0.236 and -0.069, respectively. Such results are in accordance with Schwartz's theory, since Self-Transcendence and Self-Enhancement are opposed in the motivational continuum and act as positive and negative predictors, respectively, of the dimensions that are also opposite in terms of agroecological beliefs. The Socioeconomic and Cultural and Technical-Agronomic Dimensions have antiagroecological beliefs, which are opposed to the proagroecological beliefs of the Sociopolitical and Environmental Dimensions, as explained in Model 1.

It is interesting to note that Openness to Change was a positive predictor of the Socio-political Dimension, with a coefficient of 0.209, and a negative predictor of

the Technical-agronomic Dimension, with a coefficient of -0.198. Such fact denotes that people more open to change have beliefs in favor of actions supporting Agroecology and against the use of techniques harmful to the environment, such as the use of pesticides, transgenics and chemical fertilizers. Possibly, because the Sociopolitical Dimension underlies a certain activism and a break with the current standards, related to agricultural production, which is in line with the values of Openness to Change. They are people who have the freedom to cultivate their own ideas and skills and determine their own actions, facing the technological package of agriculture now considered hegemonic.

Overall, the coefficients found showed low rates, which may mean psychometric problems, since the measures of agroecological beliefs are new or other factors may influence them. Thus, it is suggested that future studies may deepen this understanding of agroecological beliefs and the myths and beliefs associated with Agroecology, which is considered an emerging concept.

FINAL CONSIDERATIONS

In order to conclude, it is necessary to recognize some limitations in this study. The findings here refer to initial studies. The measurement of beliefs about agroecology is a recent scale and must be improved to increase its psychometric properties. Therefore, it is suggested that it be applied with other audiences related to agrarian sciences, such as farmers and other professionals who work in food production, not just those who work in the education field.

Regarding the Schwartz refined theoretical model scale, although the use of the 5-point scale revealed the same factorial structure as the original scale, it is important to do studies with the original 6-point scale for the same type target audience, to confirm the results found here. In addition, it is necessary that future studies investigate the complete model with the 19 values of Schwartz's refined theory, in order to test other relationships, besides those tested in this study. Thus, it is possible that other values not directly associated with the environmental issue may influence beliefs about agroecology, making it possible to expand knowledge about the motivations underlying the adoption of more sustainable food production models.

Nonetheless, the results demonstrated that there is an influence of the values on the beliefs about Agroecology, despite the low indexes of the coefficients. In this sense,

these facts deserve to be reflected upon when discussing the curricula of agricultural science courses, in order to strengthen and activate the values that contribute to the insertion of the agroecological approach in these curricula.

The pre-activation (priming) of values was studied by Maio (2010). According to his studies, the pre-activation of a certain abstract value also activates compatibilities and conflicts in the entire value system, conceived as mental representations of a circular structure, with mental interconnections, leading to behavior compatible with the activated values. Maio (2010) also suggests that evaluative judgments derive, in general, from beliefs about the object of our judgment, feelings about the object and past behaviors in relation to it. There is evidence that abstract values are strongly linked to affective reactions.

This way, this knowledge could be used to activate the values of Self-transcendence (mainly Universalism - Nature) and Openness to Change in Agricultural Sciences courses, so that the activation of such values can contribute to pro-environmental attitudes and proagroecological behaviors. It is expected, therefore, to promote sustainability in agrifood systems, as proposed by the Food and Agriculture Organization of the United Nations (FAO) and to contribute to the mitigation and adaptation of environmental problems.

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