

Mango as a Source of Income for Families in Magdalena by implementing the Research as a Pedagogic Strategy¹

El Mango como Fuente de Ingresos Económicos para Familias del Magdalena implementando la Investigación como estrategia pedagógica

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Abstract-- The mango industry in the Caribbean region has displayed poor and deficient performance in recent years, which has led to wasting large amounts of this fruit in Magdalena. The purpose of this study was to transform mango into a source of income for families in Magdalena by implementing the research as a pedagogic strategy (IEP by its acronym in Spanish). The methodology of the study was qualitative, using an active research approach, based on a descriptive and exploratory design. The techniques used included participative observation and use of a field journal. The study's participants were forty (40) members of the educational community at the Armando Estrada Flórez School, Pantoja Campus. The study's results identified the different varieties of tropical mango that are suitable for this strategy and the causes that prevent its development. The conclusion focuses on the need to transform the community's way of thinking about the mango in order to turn it into a source of income for families in the municipality.

Keywords-- mango, income, research as a pedagogical strategy

Resumen-- El sector productivo del mango en la región del Caribe ha tenido un desempeño pobre y deficiente durante los últimos años, ocasionando el desperdicio de grandes cantidades de este fruto en el Magdalena. El propósito del estudio fue transformar el mango como fuente de ingresos económicos para familias del Magdalena implementando la investigación como estrategia pedagógica (IEP). La metodología se orientó bajo el enfoque cualitativo, utilizando el tipo de investigación acción, desde un diseño descriptivo, exploratorio. Se utilizaron técnicas como; observación participante y diario de campo. Se contó con cuarenta (40) participantes de la institución educativa Armando Estrada Flórez, sede ERM Pantoja. Los resultados arrojaron la identificación de diferentes tipos de mango propicios para estas estrategias y las causas que impiden su desarrollo. La conclusión estuvo enfocada en la necesidad de transformar la mentalidad de la comunidad en torno al mango para luego convertirlo en fuente de ingreso económico para las familias del municipio.

Palabras clave-- mango, ingresos económicos, investigación como estrategia pedagógica.

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I. Introduction

Eating fruit is one of the healthiest habits you can have in order to maintain a rich and balanced diet. Each type of fruit has its own particular properties. Mango (*Mangifera indica*) is a tropical fruit that stands out for its particular taste and smell, and it enjoys widespread acceptance, growing demand and reasonable prices in international markets. Even though its exact origin is unknown, it is probably native from the lower mountain forests of eastern India, Bangladesh and Myanmar (Burma), between 16° and 28° North latitude [1], [2]. Others believe that its natural distribution included the wooded forest of central and southeastern India, Thailand, Laos, Vietnam, Cambodia and the Malaysian peninsula [3]

Mango has been grown for 4,000 years in South and Southeast Asia and is frequently mentioned in early Sanskrit literature in India. In the fifth and fourth centuries BC, Buddhist monks took mangos from India to the Malaysian peninsula and other regions of Southeast and South Asia [4]. In general, the most suitable planting season is as the start of the rainy season. When mangoes are planted in other seasons, they may require frequent watering.

In the tenth century AD, the Persians took it from India to the Middle East. In the sixteenth century it was taken from Goa (India) to eastern and western Africa by Portuguese traders. Its distribution in the rest of the world is relatively recent, and it reached the new world following its discovery in the 15th century. The Portuguese took it to the African continent and Brazil, and from there it was distributed to the rest of the American continent. The Spaniards introduced the plant directly from the Philippines to Mexico in 1779 and from there to Florida in 1883 [5]. Currently the mango is grown throughout the world in tropical and sub-tropical conditions, and is one of the most important fruits in the world because of its widespread acceptance for human diet, and it is planted in all tropical and sub-tropical areas of the world.

Mango belongs to the *Anacardiaceae* family, and its species is the *Mangifera Indica*. Varieties include the “bauno” *Mangifera caesia* Jack, “Kuwini” *Mangifera odorata* Griff, and the cross-breed between the “Bauno” and “Kuwini” produces fruit of excellent quality. The mango belongs to the *Anacardiaceae* family, which includes 64 genera, including the cashew (*Anacardium occidentale*). The *Mangifera* genus includes a variety of species, some of the best known of which are: *Mangifera altissima*, *M. caesia*, *M. odorata*, *M. indica*, all of which are commercially planted. [6]

In the Magdalena region large quantities of mango have always gone to waste due to the poor road conditions in the area. Also, the low cost of producing it affects its price, and for this reason many growers decide not to sell it at all. As a result, large

quantities of the fruit end up in piles on the streets, producing pests and pollution in the region. The large number of mango piles on roads in Magdalena is because the collection trucks fail to arrive to pick them up due to the poor road conditions, so they end up being abandoned and unused, as well as producing pests and bad smells in the region.

Nationally and internationally, it has been traditionally considered a difficult to handle crop in improvement programs. Some of its negative aspects include [7]:

1. Long development stage
2. High level of heterozygosity
3. Production of only one seed per fruit
4. Low level of fruit congealing and retention
5. Polyembryony
6. Large extensions of land are required to evaluate hybrids
7. Low level of knowledge on the inheritable traits and genetic relationships of its various productive characteristics.
8. Strong interaction between the genotype and the environment.

Also, even though many municipalities in the department of Bolivar produce mango, over 50% of planted hectares and harvest yields are concentrated in only 5 municipalities. Also, these 5 municipalities are located in the most productive regions, which display harvest yields that are above the national average. Additionally, the main cause for wasted production is poor road conditions in plantation areas. Improved roads would enable greater frequency of collection vehicles, thereby reducing waste percentages. Also, if rainy seasons are as strong as or worse than in recent years, the amount of production losses will grow even more.

In Colombia, the mango is considered one of the most promising first-generation exportable products because of its high level of sales. At the national level, the department of Magdalena is the tenth-largest mango producer, accounting for 8% of national production. Planted areas in the Department have been growing faster than other north coast departments. Figure 1 below displays mango production statistics at the national level.

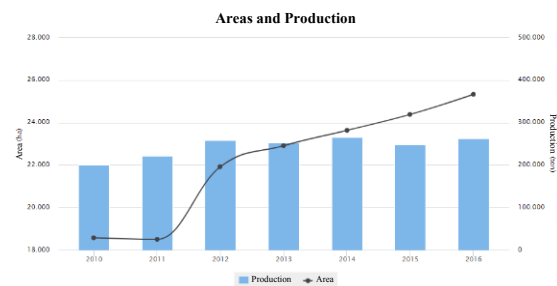


Fig. 1. Mango production statistics
Source: [8]

This study involves the microeconomics and macroeconomics of the Magdalena region, defined by Colombia's Central Bank (*Banco de la República de Colombia*) as the distribution of resources among various potential uses, and the analysis of the individual decisions of households and companies. Macroeconomics takes a general perspective of the economy, abstracting from the details of individual agents, to study the interrelationships between the various economic sectors so as to achieve the full use of resources.”[9]

There is currently a wide variety of proposed methodologies and approaches based on research, understood as the form of materializing what is done and the manner in which it is implemented, which leads to innumerable methodological approaches, including combinations thereof. This is the case of education based or founded on research, which is carried out in various contexts and can take different paths aligned with the paradigms and currents of thought in which they are framed.

This educational proposal was based on the methodology promoted by the Ciclón program (IEP), which focuses on education based on research, involving Learning through Discovery and the Ondas Program, under an approach known as Research as a Pedagogical Strategy (IEP, by its acronym in Spanish), which also incorporates elements from critical-liberation pedagogy and the socio-cultural approach, [10]

This methodology was developed in the 1980s in the UK and the US, promoted by Jerome Bruner, and was later introduced in Spain, where it was adopted by some professors at Universidad de Valencia and Universidad de Barcelona [10], where application of this school of thought began in that country. Its starting point is to recognize that the way children and scientists approach problems is organized into similar and complementary processes. Through these it is possible to rigorously apply research strategies with groups of children to enable them, by their own means and through reflection, to discover the structures of reality, as well as the theories, processes, models and products of science. In this sense, it involves an induction process that goes from the particular to the general in a guided process.

The contents of the educational process are translated into problems, and the curriculum is structured around the questions, and the students' progress and development is assessed based on broadening the previous structure as expressed through language, reasoning and knowledge. Such discovery is not necessarily autonomous, but is guided by the professors, who are responsible for planning the exercises and procedures for the intended objective. [11]

This type of learning is based on eight principles:

1. The main goal of education is to develop the capacity to resolve problems
2. Education in heuristics is much more important than delivering contents without meaning
3. The method of discovery is the path to teaching the curricular contents
4. When learning is achieved through discovery, what is learned is organized in an effective manner
5. Verbal knowledge is the key for any transfer
6. Discovery is in itself the basis for self-confidence and a source of motivation
7. Discovery ensures retention in memory
8. Discovery turns each child or youth into a critical thinker.

The focus of this methodological approach is the idea that each culture has its own knowledge, which is constantly in negotiation with the established forms of knowledge. For this reason, research with groups of children and youth focuses on the search for unity and the association of beliefs and knowledge as parts that complement each other, through a methodological approach that acknowledges the social context of the actors, who put into play various conceived ideas, which may be transmitted by recognizing the viability of various research methods that are consistent with the type of problem.

The IEP acquires new meaning in the subjectivity of these times, when children and youth are natively digital, in that they not only make use of it, but also challenge inequality in pedagogical practices, question its legitimacy and develop horizons of possibilities in which their group practices demonstrate that there is a shared future in the here and now, with the community they are working with, which enables building and thinking about such changes and transformations because they begin to experience them in their own lives.

In the same sense, teachers who work with IEP understand the possibilities of such transformations and are nourished by the exercises they carry out with their groups to produce the changes and transformation in the sphere of their pedagogical practice, and begin the process not by law or mandate, but because they find that in this way they can be educators in a different manner, without fear, in search, without certainty, but in the company of a group through which they gradually rebuild their practice. There, in the sphere of a micro-social world, is where the seeds of new communities arise that will shape the utopia of these times in education, and they participate in it knowing that it is a field under

development, and both are part of it, making the idea of the “good life” real and concrete, as set forth by our originator groups as a means for maintaining the unity of nature and culture.

The starting point for searching for alternative paths in education from a critical perspective is based on a three-fold understanding: First, that as a result of the ongoing scientific-technical revolution, we are experiencing a reconfiguration of modern schools of knowledge, which should become an opportunity to go beyond the simple modernization of education to attempt to transform the relationships of power based on control and domination for pedagogical and methodological approaches that are inclusive and display concrete designs, beyond simply denouncing and criticizing this modernization in general.

The second fact to be acknowledged is that immaterial (intellectual) work has taken on a greater role in society, becoming a generator of value, and consequently the central element for building capitalism in these times, which makes those who work with knowledge, technology, information and communications key players in society, giving educators of all types a nature that organizes and shapes the basis and foundations of these social changes [12].

It is an exercise that will require every educator to acknowledge and rebuild themselves as players under these new conditions, which will demand redesigning the previous forms around the new conditions, as well as transforming the institutions they work at. In this sense, their subjectivities and fields of action become fields with new meanings, and consequently a battleground to develop either a project for emancipation or a simple modernization at the service of society's dominant groups. This is where the educator brings into play his or her human capacity at the service of precise and specific interests [13].

The third element to be acknowledge from a critical perspective is that one of the central aspects in the configuration of immaterial work is research, which gives shape to this new project on capital control, as it is one of the tasks that most value adds, and consequently it plays a key role in the current modality of accumulation. Its role is recognized as a key factor in the configuration of the revolutionary times in which we live. While it has generated these new conditions in society, it has established itself as a field of knowledge, generating a large amount of information and various approaches from and towards it, and in many cases with their specific particularities.

In this sense, research from the perspective of critical education schools of through means a theoretical-practical struggle over the way the

assumptions on knowledge, science, epistemology, culture, humanities and social groups frame an action that for four hundred years has been labeled as objective, and has not only built a form of it, but has also helped create forms of power that in society have served to control and gestate inequalities, and in these times, new forms of accumulation and domination [14].

Stated differently, it is necessary to acknowledge the importance of research in society, while at the same time revealing the interests that are present. In practice, it develops a critical stance, which in the context of these times is under the obligation not only of denouncing, but also of appropriating it as a very important reality in these times for the development of proposals that while promoting its critical appropriation, serves not only to modernize, but especially to transform contexts, cultures, epistemologies, and redirect its scenarios of power to create subjectivities and citizenships that while acknowledging the place of the local are open to a global time-space and to new scientific-technological mediations of these times to materialize the construction of societies that are more democratic, fair and human, as well as the need to take a stand on it in any emancipating project.

In Latin America and in other subordinated groups of the Northern world, and other critical actors from other continents, from the perspective of the accumulation of the Latin American paradigm, an educational work perspective has been developed with the characteristic that it is a political action in the sphere of education; it is aimed at transforming the conditions of control, domination and forms of subjection of actors, communities and institutions. To achieve this it seeks to raise critical awareness and social dynamics that lead groups to build associative and organizational forms that make them collective subjects, builders of their history [15]

Research as a pedagogical strategy has taken some basic elements from people's education and has turned them into the focus of its approach, differentiating itself from other pedagogical approaches based on research by undertaking a collective construction process of its proposals, incorporating children, youth, teachers, counselors, and giving shape to a particular way of generating people's education processes with these groups. For this reason, the starting point is the reality of these groups and their knowledge, to elaborate on them through the research process.

On the other hand, reality is constructed through language, which makes explicit the world view through which the actors of research as a pedagogical strategy ask themselves about

it, interpret it and formulate research problems, in the legendary sense that was given through active-participative research to understand reality and transform it. From this perspective, it promotes focalized learning, which acknowledges these multiple dimensions that make up the human experience and the organized core that performs it. Making this a reality means that a social organization must be developed to make it concrete; for this reason the IEP promotes the social mobilization of actors, without which the existence of the Program in the regions is not possible. [16]

In the departments and municipalities, the actors choose to develop the proposal; i.e. they develop networks (social, political, of institutional actors) that make this search a reality by working in coordination to implement it in the various territories and spaces of their respective regions. These networks have recognized the need to transform the educational processes, the relationship between adults and children, and the social relations mediated by these practices. For this reason, the option is developed in the specific context, with the particularities of the culture, based on established subjectivities. All these in one relationship: social organizations, subjectivities, social practices, stimulating a scenario of individualization where the integral nature of the human being (reason, emotion, action, interests) must be put into play to acknowledge that we become human in the difference and in a conflictive interaction with others and their realities.

For this reason, reality is a construction, and the IEP proposal realizes this acknowledgement that we are part of the world, and that there is no such duality of human vs. nature. Consequently, when the child or youth ask themselves a question, [10] it is not about something external, it is about themselves, their place in the world, their way of understanding it, feeling it, in the sense of thoughtful feeling, and the ways of transforming it in their interaction with reality. [17]

This is where the other principle of people's education applies, in that reality is studied in order to transform it by transforming ourselves, all within an ethical horizon that seeks to reveal and face of segregation, exclusion and forms of control and domination that are produced by the multiple manifestations of power in our society: political, economic, social, ethnic, of knowledge, of subjectivities, of gender and in the exercise of the educational and pedagogical practices; building a spirit of human emancipation, in order not to develop power processes that control or dominate, and not to allow others to do this in their own lives. [18]

The IEP postulates the existence of knowledge that is driven more by experience and the actions

of human beings, and of knowledge that is gained more in the sphere of the disciplines. In this way, it postulates the existence of rationalities other than the North American Euro-centric [19] ones, which must also be acknowledge in the educational practice, making reality an inter-cultural relationships of cultural negotiation; this exercise must be open to reasoning that goes beyond the "universal reason", to make visible the recognition of the other and of that which is different than what is postulated as universal, born from the logic of control and power, to make visible in the differences of their knowledge, their history, and when appropriate, recognize them as ways of thinking that have been suppressed or made invisible. It is the exercise of recognizing contexts as places of knowledge, For this reason, it seeks to return to the act of educating on the inclusion of differences, heterogeneity and multiplicity based on cultural, social and cognitive diversity.

From this, what any education action develops are social relationships that represent in a pedagogical manner what we think in society. For this reason, the role of the educator is that of a teacher - learner, acknowledging the way in which he/she teaches at the same time as he/she learns. In this sense, the teaching role is active and also educates the accompanying adults while they are learning, which creates educational relationships starting out from the differences in inter-cultural relationships [20], from the respect and recognition of the contributions of each. For this reason, in the IEP, teachers become companions and co-researchers, transforming their traditional role and recognizing themselves as learners in the process.

In the case of the IEP, the starting point is the common sense question of the children and youth, to redeveloping it from the perspective of people's education, which recognizes the existence of common knowledge that has been developed in the negotiation with disciplinary knowledge, and in the ways they are correlated in cultural negotiation, [20] which demonstrates the manner in which these transformations take place, through collaborative learning with the intervention of children and adults. In the sense of Vigotsky, every function appears in two planes: in the social plane (inter-psyche) and in the psychological plane (intra-psyche).

The idea of learning of [21] also starts out from this approach and redevelops it. "Learning is a universal and necessary aspect of the culturally organized and specifically human development of psychological processes"; in other words, pedagogically organized, it becomes mental development and continues to generate evolutionary processes that could not take place without it. This is where the relationships between the subject and the mediator are active and reciprocal;

knowledge is born from internalization. In this sense, learning is a differentiated activity, and for this reason it cannot be made equivalent to development.

II. Methodology

A qualitative study was performed, using the action-research model, based on a descriptive and exploratory design. The qualitative research seeks to learn or and interpret the reality of the participants through their own experiences, providing subjective information on the studied phenomenon. [22] The action-research model seeks to produce knowledge based on reflection by participants, taking into consideration the active participation of teachers in the learning process and providing technical assistance, guiding the student in the research process, to generate new knowledge about a given reality in a collaborative learning process.

Descriptive studies are aimed at specifying the characteristics of the studied population or the phenomena subject to analysis. The study is exploratory because no previous studies have been carried out at the school. [22]. A sample of forty (40) students was selected from the Armando Estrada Flórez School, Pantoja Campus, in the municipality of Zona Bananera, Magdalena.

Data was collected by means of participative observation through a field journal. These are qualitative data gathering techniques that imply that the teacher takes on an active role in the research process, not only as a spectator of the implementation process, but also as a participant, recording each observed element related to the studied variable. The field journal is used to record and systematize the elements obtained from the participative observations, where contact with the people in the context modulates the reflections and conclusions that can be extracted.

III. Results

The implementation of this study produced numerous results from the application of innovative learning strategies and methodologies based on significant experiences. This fully experiential process involved application of the IEP proposed by the Ciclón program for the case study of mango in the Magdalena region.

By implementing the IEP, theoretical references and conceptualization were developed on the mango, its properties and uses. An information source was found on businesses in the region

that produce and sell mango and the main reasons why so much material is wasted during its production and distribution. A theoretical baseline was created on the methods for transforming mango and the steps involved in the process of harvesting, systematizing and transforming the mango.

It involved learning the mango varieties that are produced in the region and other varieties that would be suitable for this market, not only at the regional but also at the national level, affecting the micro and macro economies of the Caribbean regions, affected by problems related to the production of fruits of this type.

The students and their families increased their environmental awareness on the use of the ecological resources they have in their surroundings, and at the same time that they are active agents in caring for the environment in the region, in this case in reducing the waste of piles of mangos and their associated pests and bad smell.

In general, the families in the area where the school is located will turn this problem into an opportunity for improvement, which at the same time as they learn, generates a source of jobs and income. At the institutional level, a space was propitiated for students and families to demonstrate the work they have done and to sell the products they have made.

IV. Conclusions

It becomes evident that the region requires a productive model with leading edge technology for the production of mango, implementing environmental standards for its execution, such as the preservation of soils, forestry activities and applicable agronomical practices for growers. All the above through strengthening of the knowledge systems in the region, and creating organizations in charge of promoting the export and sale of mango-based products.

Creation of a research, development and innovation plan for the region through the Ciclón program, focused on motivating a citizenship culture around the environmental problems and poor mango growing practices, and implementing studies on the natural resources of the Caribbean region, and specifically the department of Magdalena.

The development of spaces for exchanges between growers, producers and researchers in these municipalities on the materials that are being wasted during transportation and possible options for the recovery of these abandoned supplies due to the shortage of road resources in good conditions for their adequate and appropriate distribution.

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