

Analysis of the origin and training of the labor dedicated to the post-harvest process of banana in Tecomán, Cerro de Ortega, Colima, Mexico

González-Rodríguez, M.S.¹; Escalona-Maurice, M.J.¹; Almeraya-Soberanes, S.¹; Romero-Balam, R.¹; Espinosa-Morales, J.C.¹

¹ Colegio de Postgraduados, Campus Montecillo. Carretera México-Texcoco, km 36.5, Montecillo, Texcoco Estado de México.

* Correspondence: marioglez89@hotmail.com

ABSTRACT

Objective: To analyze and identify the place of origin, skills and working conditions of the laborers dedicated to the banana cutting and packaging process in the town of Cerro de Ortega, Tecomán, Colima.

Design/Methodology/Approach: A field checklist was designed and applied to 32% of the local crews and a survey directed to the members of the crews, surveying 21.3% of the total population.

Results: Information was obtained to carry out the analysis of origin and the current situation of laborers dedicated to the post-harvest process of banana in the study area.

Limitations of the study: An important limitation for the research was insecurity during the field surveys, which was present derived from the organized crime settled in the area.

Findings/Conclusions: The most specialized workers in the area who are dedicated to the activities of cutting and packing bananas are not native people from the municipality of Tecomán, nor from the state of Colima. They belong to the states of Chiapas and Michoacan.

Keywords: Training, agricultural labor.

Citation: González-Rodríguez, M.S., Escalona-Maurice, M.J., Almeraya-Soberanes, S., Romero-Balam, R., & Espinosa-Morales, J.C. (2022).

Analysis of the origin and training of the labor dedicated to the post-harvest process of banana in Tecomán, Cerro de Ortega, Colima, Mexico. *Agro Productividad*. <https://doi.org/10.32854/agrop.v15i9.1804>

Academic Editors: Jorge Cadena Iñiguez and Libia Iris Trejo Téllez

Received: August 31, 2020.

Accepted: July 19, 2022.

Published on-line: October 06, 2022.

Agro Productividad, 15(9). September. 2022. pp: 33-42.

This work is licensed under a Creative Commons Attribution-Non-Commercial 4.0 International license.



INTRODUCTION

In the State of Colima, the banana is a crop that requires a lot of labor. Although it does not require many personnel in the cultivation tasks that are carried out within the orchard, it does require many people during the harvesting process and post-harvest. A clear example is that regarding the production process, two contracted laborers and the owner of the orchard can easily take over the management of up to 10 hectares. While for the harvest and cutting of those same 10 hectares, between 8 to 12 people are required to carry out this process (Consejo Estatal de Productores de Plátano de Colima - CEPPC, 2016).

For Spencer (1993), labor is defined as all those services that laborers, semi-qualified workers, professionals and independent entrepreneurs provide. Therefore, they are considered as salaried workers receiving a wage, per hour, or year; or in the form of bonuses

or commissions. The salary is then, the cost paid for the use of their services; which can also be a specific rate in agreement for a certain amount of work.

Gamboa *et al.* (2015) defines agricultural worker or laborer, as the person who receives a salary for their labor in an activity in the field within a production process. In most cases, the wage is obtained per day and in Mexico is called “jornal” (a labor-day payment).

In the case of laborers engaged in the cutting and packaging of bananas in the region, they can be categorized as a specific type of hand-work. They provide a unique service in the area, that any other group can not particularly provide and do so based on the definition of Spencer (1993). This labor force works for a salary, which is a specific remuneration on a countable amount of work, since they charge payment for a full truck, instead of per weight or per boxes.

Previously, in the state of Colima, people from states such as Tabasco and Chiapas were mobilized to go to work in the Colima fields. One main reason was that these people could be paid less for their services than native workers of the state; coupled with the scarcity of skilled labor in several of the post-harvest processes of agricultural products in the state of Colima. Day laborers of other states accepted, since that represented an income greater than what they received in their states of origin carrying out the same agricultural activities. Once they arrived to Colima, they were distributed in the different crops that demanded this labor and in the activities in which they had already had experience. In the case of banana, plantain it is a perennial crop in which harvest can be made every week due to their staggered plantings. This fact gave foreign laborers the baseline to have a constant source of employment.

CONAPO (2018) defines migration as the action by which a person stops residing in a specific geographic unit (either way a municipality or delegation, a federation state or a country) to establish their habitual residence in another.

Pimineta (2002) defines migration as any spatial movement that implies a change of residence and results in the continuous stay in the destination. In this sense, the necessary condition for migration to exist is that there must be a change in the geographical place of residence of one or a group of individuals, in order to settle permanently in another place different from their origin.

Despite the fact that this practice was carried out seasonally, agricultural workers from other states of the republic have been settling in the Colima territory. In the case of the workers of the banana post-harvest process, little by little they have got to live in Colima. Moreover, they have been developing and improving empirically the knowledge they have in these tasks; they have formed non-formal groups now called crews which have rustic work equipment to carry out the packaging of banana in a differentiated way in process. Even with difference in price between first quality (packing in one-time use cardboard boxes) and second or third quality (packing in reusable wooden boxes). They work in a mobile way; obviously these crews are not fully trained, which causes waste during the process of cutting and packing the fruit, thus land owners and producers income is reduced.

In the state of Colima during 2015, 179,820 tons of bananas were produced in an area of 5,567 hectares. These yields place the state as the fourth most important producer at the national level (SAGARPA, 2016). Within the Colima state the main banana areas are located

in the municipalities of Tecomán, Armería, and Manzanillo. In all municipalities, small-scale producers predominate. This productive activity is carried out by approximately 463 producers represented in five local associations and 8500 agricultural workers that are not organized in any union and do not have formal training to perform cutting nor packaging activities. There is then an increase in unnecessary fruit waste during this part of the post-harvest process, affecting the income of the banana producers in the state (CEPPC, 2016).

Tecomán is the largest municipality in agricultural production in the state, with a sown fields cover of 4140.04 hectares, reaching 3512.84 hectares of harvested area, a production of 136 904.00 tons and a total production value of \$348 102 352.72 (SIAP, 2016). In the territory there are agricultural companies dedicated to produce and export bananas of the giant-dwarf variety. There are large areas planted with this crop and specialized facilities for the packaging process. Therefore, they attract a lot of the labor force in the region. However, they have a large labor rotation over a very short time, meaning that these companies do not retain workers as they should. As the packers are unemployed and for small- and medium-scale producers, those packers are the only alternative they have, a negotiation process begins, because the producers need means to pack their fruit on time. Thus, despite any other circumstance the producer has to pay more for their services, also facing the risk that the packers or crews do not completely know how to carry out the appropriate process, then causing losses in the quantity and quality of their product.

For this reason, a research was carried out that allowed to analyze the current situation of the workforce in the town of Cerro de Ortega, Municipality of Tecomán, state of Colima, in order to characterize the activities carried out within the process of cutting and packaging of banana and to identify skills and technical capacities that cutting and packing laborers should have in order to improve post-harvest handling so that plantain producers can offer quality fruit to the market.

MATERIALS AND METHODS

According to the State Council of Banana Producers of Colima SC. (CEPPC) the strongest banana region in the municipality of Tecomán in terms of production and specialization in cutting and packaging is in the town of Cerro de Ortega, which is why this area was defined as the study area.

In the region of Cerro Ortega there are 25 gangs identified by producers and works in the process of cutting and packaging this is to universe such , on average each comprises gangs of 12 people , in field is sampled at 32% of the total number of crews in the community, applying a checklist to evaluate the activities they carry out, was surveyed 21.3% of the total population that is dedicated to the process of cutting and packing plantains in the town of Cerro de Ortega , with the purpose of knowing the origin and origin as well as the labor capacities they have and analyze the current situation in which they are organized as a productive work unit.

This research was carried out in the municipality of Tecomán, Colima, which is located in the southeastern portion of the state between coordinates 103° 59' to 103° 73' of West longitude and 18° 41' 20" to 19° 06' North latitude. The approximate distance from the municipal seat to the state capital is 46 km, the municipal area of Tecomán is 789.7 square

kilometers. Due to extension, it is the second largest municipality in the state of Colima, since Tecomán encompasses the 14% of its territory (INAFED, 2017).

In this municipality, the main types of crops are perennial and to a lesser extent cyclical. There are 38,308 hectares in agricultural use (INEGI, 2016). In the state of Colima, Tecomán stands out for the production of banana, ranking as the main producer of this fruit at the state level (SIAP, 2016). To the south of Tecomán at 26 km it is located the town of Cerro de Ortega which has 3899 cultivable hectares. Among the main crops grown in the area, banana, coconut palm and lemon are predominant. The community of Cerro de Ortega has 7598 inhabitants (INEGI, 2017) dedicated mainly to plantain cultivation (D. Castillo *et al.*, 1998). Among the activities that plantain cultivation requires are the activities of cutting and packing the fruit, this is banana postharvest handling, which demands a lot of labor due to the large number of workers it requires. In the town of Cerro de Ortega, the inhabitants have specialized in these practices, besides those cultivation practices in the field.

RESULTS AND DISCUSSION

Among the activities that the banana cutting and packing process comprises, there are some that workers can carry out regardless of gender, age or experience. In the field, it was found that the minimum age of the surveyed laborers was 15 years old and the oldest was 60 years old. The person with the most work experience has 47 years, while the average in the sample is 10 years; the person with less time of work experience had 0.5 years on the job.

As part of the research objective, it was proposed to identify the place of origin of the labor force dedicated to the banana cutting and packing process, since it was hypothesized that the majority of the most trained labor force dedicated to these activities is not native to the state. That is, they are people who have been immersed in a process of migration and come from different states of the Mexican republic.

The data collected in the field have provided information that supports this hypothesis, 72% of the people who comprise the sample come from other states of the Mexican Republic and even other countries. They have acquired their knowledge in an empirical way and have been improving through time.

It is important to define the concept of labor skills or job competencies, because the search for new, better-paid work opportunities is a function of those. These skills should be an important factor to be considered by laborers before they intend a migratory movement. Hoffman (1999) defines labor skills and work behaviors of people, those which are needed to perform an effective work. The concept is applied on individual basis to a person that does a particular work.

Martens (1996) indicates that the competences are the real capacities of an individual to master the set of tasks on performance in a specific work offer.

The National Council for standardization and certification of work competences in Mexico (CONOCER, 2018) defines the job skills of people as individual-based knowledge, skills, and behaviors. This is what makes them competent to develop a given activity through their working life. It is worth mentioning that the competences are developed by

Table 1. Places of origin of the labor force.

Distribution of the States of origin of the workers		
Mexican state or country of origin	Workers (number)	%
Chiapas	34	46.58
Tabasco	7	9.59
Colima	20	27.40
Michoacán	9	12.33
Puebla	1	1.37
Guatemala	1	1.37
El Salvador	1	1.37
TOTAL	73	100

Source: own elaboration with data collected in the field.

any type of person who performs a job. Competences are not limited on whether a person is a professional or not.

For Levy-Leboyer (1997), cited by Díaz *et al.* (2002), competences are repertoires of behaviors that some people master better than others, which makes them effective in a given situation. These behaviors are observable in the daily reality of work and also in testing scenarios.

In the field, it was found that the necessary skills that workers dedicated to the banana cutting and packing process must develop were a response to the type of packaging where the fruit would be packed and transported. According to Tharanathan (2003), the main advantage of the packaging of the various types of products is product protection and preservation; food and raw materials are their highest-priority in terms of development. Those products require attention due to the contamination generated by microorganisms (bacteria, spores, fungi, etc.) during handling.

The main types of packaging used to storage bananas are wooden boxes covered by a plastic bag and newspaper wrap for second-quality fruits that are destined for Mexico's national market. But for the Premium export and national first-quality fruits cardboard single-use boxes, fruits covered with thin plastic bags or Kraft paper (in some cases even, they are closed at high-vacuum depending on the distance of the destination of the fruit).

In the case of wood packaging, it is transported in open wooden cabinets on the chassis of big trucks with an average capacity of 14 tons. Of that people surveyed, 22% declared that they have specialized in this type of packaging and transport, since it does not require too much work specialization. The market where this fruit is placed is not very demanding, workers take around 8 hours on average to fill these trucks, so for one day they only pack fruit to fill one truck.

78% of respondents stated that they are specialized in packing in cardboard boxes, indicating that a person needs to perform one series of more delicate and specialized activities, therefore, these crews get a higher salary than those that pack in wooden boxes. The market to which higher-quality fruit is directed is more demanding due to the first-

quality national and Premium export quality standards. A special means of transport in dry-ambient closed trailers with a Thermo King™ refrigeration system with an average capacity of 22 tons, the equivalent to 1200 boxes packed and stowed. The estimated time for one crew to fill one of these trailers is 8 to 10 hours depending on the field and technological conditions at the orchards, therefore it was found that they also can only fill one trailer per day.

Regarding the degree of training of the crew members, it was found that only 39% of them have received proper training, while the remaining 61% have obtained their knowledge by seeing how the activities are carried out by their crewmates. Of the people who reported that they had got a training course, it was found that 72% of them had access to these courses from the companies where they worked; that is, from the private capital sector. Finally, it was found that 12% have received training by close family members.

It is worth mentioning the absence of Governmental or producers' organizations; only 4% of the people who affirmed that they had got training, reported that it was obtained from an organization. The 90% of respondents stated that they were not asked any minimum experience to start working with the crew. General assumption is that in fact, workers learn by daily experience as working occurs.

Derived from the difference in the types of packaging used for fruit, the workers have had to develop knowledge and competences to fit in more than one working position within the crew. Of those interviewed 81.2% have stated that they know how to make more than one activity in the crew, while the remaining 18.8% have limited themselves to work in a single position and have not shown interest in training.

Training represents a better alternative for work because laborers can temp-replace other workers in other crews. This gives them flexibility to obtain a better income on certain occasions.

Table 2. Percentage of workers trained by activity.

Activity	Workers who know how to carry out the activity (%)	Workers who do not know how to carry out the activity (%)	Total (%)
Cutting	93.75	6.25	100
Carrying	90.62	9.38	100
Reception	93.75	6.25	100
Fruit bunch trimming	89.06	10.94	100
Selection	76.56	23.44	100
Rinse	85.93	14.07	100
Tray-delivering of fruit bunches	68.75	31.25	100
Labelling	78.12	21.88	100
Aspersión	85.93	14.07	100
Packing	76.56	23.44	100
Paper-wrap coverage and box packing	93.75	6.25	100
Stowing	85.93	14.07	100

Source: own elaboration with data collected in the field.

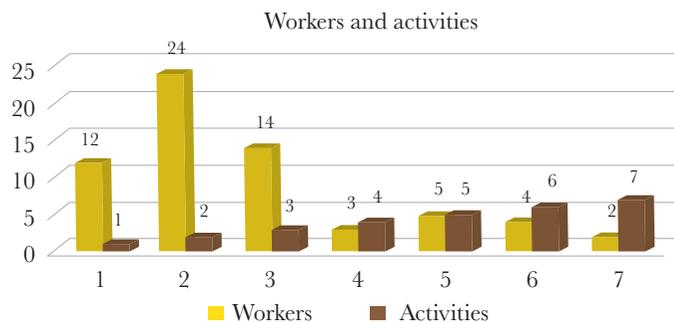


Figure 1. Number of workers and number of activities they know how to perform.
Source: Own elaboration with data collected in the field.

It can be seen in the previous graph that very few people know how to carry out more than 4 activities. That would give people more flexibility and the opportunity to work with more than one crew per week. An important fact that should be highlighted is that these more trained people arrived from the states of Chiapas and Michoacan. This is noticeable because it shows a direct relationship between the workers’ level of training and the state from which they proceeded.

Within the whole packaging process there is a differentiation among payments for activities. This is due to two factors, the first one is the degree of specialization that is required to carry out the activities; as in the specific case of the people dedicated to cut and carry, and the others packing the fruit. The second factor that drives payment differentiation is the physical effort necessary to carry out the activity. As there are some activities that demand more effort than others, such as the trimming of the fruit bunches and the carrying.

Below is a table showing the average payment per activity:

Table 3. Average wages per activity according to the type of package.

Activity	Average salary	Minimum wage paid for activity in wood	Maximum wage paid per activity in cardboard
Cutting	\$525.00	\$400.00	\$800.00
Carrying	\$500.00	\$500.00	\$500.00
Reception	\$400.00	\$350.00	\$500.00
Fruit bunch trimming	\$400.00	\$400.00	\$400.00
Selection	\$490.00	\$450.00	\$600.00
Rinse	\$375.00	\$350.00	\$450.00
Tray-delivering of fruit bunches	\$345.00	\$300.00	\$450.00
Labelling	\$340.00	\$300.00	\$400.00
Aspersion	\$300.00	\$300.00	\$300.00
Packing	\$527.00	\$400.00	\$650.00
Paper-wrap coverage and box packing	\$450.00	\$400.00	\$500.00
Stowing	\$512.00	\$350.00	\$700.00

Source: own elaboration with data collected in the field.

It is worth mentioning that 95% of sampled workers stated that they work in up to four crews a week; that they exchange their working positions, diversifying their income. Whereas the remaining 5%, worked for a packaging company and had their positions established within their crew. These latter workers are guaranteed to work 6 days a week while the others can work 4 days a week on average. Because of that, they have had to find a way to insert themselves into other crews.

The crews in Cerro de Ortega are well-organized structures within their functions, the workers have specific positions and tasks. 95% of the crews interviewed have a representative or manager for the crew, who in general terms is their employer, he is the one who hires them and agrees with the producer.

The head of the crew carries out the coordination activities, recruitment, work position assignment and promotion of the work of the crew; advertising offers for them to producers and traders in the area. That person is responsible for transporting all workers from a meeting point towards the orchards where the work is needed. Usually, the head of the crew is the owner of the specialized equipment they use to pack in cardboard boxes, such as trays, iodine, roller belts, water tanks, tubs, spray backpacks, racks, tarps and equipment/workers transportation, which usually occurs in a three-ton truck. 64% of respondents stated that these tools are owned by the head of the crew. While 36% said they each had their tools. However, this statement was made primarily by personnel who perform their activities with just a curved knife (named *chaveta*) or a machete. Therefore, we can affirm that the most specialized equipment and material are properties of the head of the crew.

In the case of packaging in wooden boxes, only a tub, iodine, tarps, a water tank, umbrellas and a truck are needed. The truck is used to transport personnel and material, which are also the property of the head of the crew.

As it was mentioned above, the two types of packaging render not the same results. Thus, they are not made the same, mainly due to the equipment and materials used during these two processes neither are the same.

CONCLUSIONS

The main hypothesis of this work mentions that the place of origin of the members of the crews dedicated to the activities of cutting and packing bananas is not the town of Cerro de Ortega, municipality of Tecomán, state of Colima. We confirmed that hypothesis by finding that the workers dedicated to the activities of cutting and packing bananas are not predominantly native people of the municipality of Tecomán, neither even from Colima. It was then confirmed that the most qualified workers in this job are people who have arrived to Colima from states like Chiapas, Tabasco and Michoacán. The prior knowledge that these people have developed in their place of origin helps them to position themselves more easily in this job.

In a similar way, a direct relationship is seen between the number of activities they know how to perform and the wage that workers can achieve. Their level of training is the result of the time they have dedicated to the banana post-harvest activities. Since in this work they can begin at a very early age, and to start performing these activities they do not require prior experience, the visually learning process is easier for them, following the

trial-and-error sequence, mastering it through repetition. Thus, we concluded that it is a process of work evolution, and a type of non-formal interpersonal training.

The workers who come from other states are specialized in the handling of first quality fruit and Premium export quality, that is, they are dedicated only to packing the fruit in cardboard boxes. Since it is better paid than packaging in wooden boxes, the settlement of this labor force has been more accentuated in the municipality of Tecomán, because it is the main bananas producer in the state of Colima. The town of Cerro de Ortega is located in a privileged geographical area as it borders the municipality of Coahuayana, Michoacán. Both communities are among the most specialized in terms of production, post-harvest handling and commercialization of bananas in the central Pacific region of Mexico. This fact makes Tecomán and Cerro de Arteaga ideal places for the settlement of this migrant labor force from other states who have already had experience in this type of field work.

REFERENCES

- Spencer, M. 1993. "Economía Contemporánea" tercera edición. <https://books.google.es/books?id=Tdhoer6obAC&lpg=PR7&ots=d2CAKIUVIA&dq=%E2%80%A2%09Spencer%2C%20M.%201993.%20%E2%80%9CEconom%C3%ADa%20Contempor%C3%A1nea%E2%80%9D%20tercera%20edici%C3%B3n.%20%20&lr&hl=es&pg=PR8#v=onepage&q=%E2%80%A2%09Spencer,%20M.%201993.%20%E2%80%9CEconom%C3%ADa%20Contempor%C3%A1nea%E2%80%9D%20tercera%20edici%C3%B3n.&f=false>
- Gamboa, C., & Gutiérrez, M. (2015). Jornaleros agrícolas en México. Antecedentes, políticas públicas, tratados internacionales, causas y efectos del problema, iniciativas y opiniones especializadas. México. dirección de servicios de investigación y análisis, Cámara de diputados, LXIII Legislatura. <https://www.diputados.gob.mx/sedia/sia/spi/SAPI-ISS-78-15.pdf>
- Pimienta Lastra, R. (2002). Análisis demográfico de la migración interna en México 1930-1990 (No.304. 80972 P5). https://books.google.es/books?hl=es&lr=&id=ioIxSxZbKdUC&oi=fnd&pg=PA23&dq=%E2%80%A2%09Pimienta,+R.+2002.+%E2%80%9CAn%C3%A1lisis+demogr%C3%A1fico+de+la+migraci%C3%B3n+interna+en+M%C3%A9xico+1930+1990%E2%80%9D+primera+edici%C3%B3n.&ots=P8U5Zt7-gc&sig=c_IWliEQJ39v5JxsX8HmzNoC7nc#v=onepage&q=%E2%80%A2%09Pimienta%2C%20R.%202002.%20%E2%80%9CAn%C3%A1lisis%20demogr%C3%A1fico%20de%20la%20migraci%C3%B3n%20interna%20en%20M%C3%A9xico%201930+1990%E2%80%9D%20primera%20edici%C3%B3n.&f=false
- Hoffmann, T. (1999), "The meanings of competency", *Journal of European Industrial Training*, Vol. 23 No. 6, pp. 275-286. <https://doi.org/10.1108/03090599910284650>
- Mertens, L. 1996. Competencia laboral: Sistemas. Surgimiento y modelos. Montevideo: CINTEFOR. https://www.oitinterfor.org/sites/default/files/file_publicacion/mertens.pdf
- Arancibia, V. H., & Díaz, R. (2002). Enfoque de las competencias laborales: Historia, definiciones y generación de un modelo de competencias para las organizaciones y las personas. *Psyche*, 11(2). https://www.researchgate.net/publication/341817483_El_Enfoque_de_las_Competencias_Laborales_Historia_Definiciones_y_Generacion_de_un_Modelo_de_Competencias_para_las_Organizaciones_y_las_Personas_The_Approach_of_the_Cornpetences_at_Work_History_Definit
- Tharanathan, R. N. (2003). Biodegradable films and composite coatings: past, present and future. *Trends in food science & technology*, 14(3), 71-78. [https://doi.org/10.1016/S0924-2244\(02\)00280-7](https://doi.org/10.1016/S0924-2244(02)00280-7)
- Capacidades Laborales, Consejo Nacional de Normalización y Certificación de Competencia Laborales en México (CONOCER) disponible en: <http://148.244.170.140/index.php/queeslacertificaciondecompetencias.html> consultado el 06-03-2018
- Castillo, D., Flores, H., González, M., J, Martínez. Rincón, G. Luis, Silva. 1998. Evaluación social de la pavimentación del camino cerro de ortega - callejones, en el municipio de Tecomán, Colima. (perfil). <https://docplayer.es/22470336-Evaluacion-social-de-la-pavimentacion-del-camino-cerro-de-ortega-callejones-en-el-municipio-de-tecoman-colima-perfil.html>
- Consejo Estatal de Productores de Plátano de Colima S.C. (CEPPC). 2016.
- Instituto Nacional de Estadística y Geografía (México), 2017, Anuario Estadístico y Geográfico de Colima 2017/ Instituto Nacional de Estadística y Geografía-México: INEGI, c2017. <https://www.inegi>

org.mx/contenido/productos/prod_serv/contenidos/espanol/bvinegi/productos/nueva_estruc/anuarios_2017/702825092061.pdf

Migración CONAPO disponible en http://www.conapo.gob.mx/es/CONAPO/Glosario_Migracion_Interna
<http://www.inafed.gob.mx/work/enciclopedia/EMM06colima/municipios/06009a.html> http://infosiap.siap.gob.mx/aagricola_siap_gb/icultivo/index.jsp

Migración CONAPO disponible en (http://www.conapo.gob.mx/es/CONAPO/Glosario_Migracion_Interna)
consultado 23-02-2018.

