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THE MANUAL HARVEST OF TOMATOES: BETWEEN PRESCRIPTION AND TACIT KNOWLEDGE

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ABSTRACT

The competence of workers engaged in manual tomato harvesting is intrinsically related to the cooperation and the knowledge acquired in practice. The aim of this paper is to analyze the contribution of the tacit knowledges of workers involved in tomato harvesting in the elaboration of strategies that guide the choice of the fruits to be harvested. Based on the Activity-centered Ergonomics concepts, a case study was conducted on three farms in the interior of the state of São Paulo, Brazil, using as tools: free observations, interview with semi-structured script and analysis to the verbalizations of manual tomato harvest workers. The results show that the workers construct a mental map as a reference of what is a suitable fruit to be harvested, formed from several multisensory information. The worker classifies and tacitly selects the fruit according to the quality prescribed in protocols, even without having received formal training. Therefore, although considered as a legwork, this study shows the complexity of the knowledge mobilized in the harvest and the importance of understanding this process to better understand the real work.

KEYWORDS: Activity-centered Ergonomics; Agriculture Cultive; Tacit Knowledge; Tomato.

1. INTRODUÇÃO

Agricultural work is immersed in a universe of uncertainties and variabilities such as climate changes, price instability, and multiple operational activities to be carried out simultaneously (Montedo & Sznelwar, 2008). The way in which workers confront these events during their work practices is still underreported in the literature.

Guimarães (2002) emphasizes the importance of scientific production regarding the conditions of workers in this productive sector. Other researchers highlight the importance of ergonomic studies in agriculture, warning about the precariousness of working contexts that dominate field activities (Abrahão, 2004; Frank et al., 2004; Iida & Buarque, 2016; Jafry & O'Neill, 2003; Myers, 1997; Tillmann, 1994; Ulbricht, 2003).

There are few works related to tomato production from the perspective of Activity Ergonomics and tacit knowledge (Silver et al., 2014; Manz & Silver, 2013; Ribeiro et al., 2009; Braga, 2007). Such knowledge should be recognized and valued because it forms the basis of decisions made by these workers, translated into actions taken to achieve expected results, and is fundamental in regulating their work strategies (Binotto et al., 2013).

Without knowing the official classification of the fruit, as defined by regulations, workers create references regarding quality aspects based on their own experience (Duarte Duarte, 2003). Workers pick up the fruits by hand and, through touch and sight, can distinguish which tomatoes are suitable for consumption, which are not yet ripe, and which should be discarded. By rejecting the fruits, workers also identify the causes of defects and act preventively, working with the producer to ensure that other fruits do not exhibit these irregularities. Workers identify these aspects even without formal training (Binotto et al., 2013; Rodrigues et al., 2010; Braunbeck & Oliveira, 2006). The knowledge of workers is undervalued, although it is the most genuine way to understand the world of work.

The cultivation of tomatoes is of great importance to the Brazilian economy due to its economic and social significance for the country, which produces about three million tons per year (Tabosa et al., 2014; Ribeiro et al., 2009). The state of São Paulo is the second-largest Brazilian producer of the fruit, surpassed only by the state of Goiás (IBGE, 2014). The fruit is difficult to cultivate and monitor (Rodrigues et al., 2010), and even with all the care in planting, irrigation, and pesticide management, there is no guarantee that the tomatoes will reach the end customer at a price favorable to the producers.

At the time of harvest, the quality of the fruit is put to the test as workers analyze each fruit, selecting, discarding, and identifying problems that will require future care. De Biase (2007) states that the agricultural work process has a symbolic meaning and a knowledge model that cannot be fragmented or separated. It is in this scenario that the work of manual tomato pickers is inserted, and to understand the activity of these individuals, a systemic view is necessary.

To understand the world of activity, facing complex environments (as in the case of tomato pickers), ergonomics emerges as an analytical method that confronts empirical data from observation and measures of behavior (operational modes in relation to variables) and individual and collective interviews aimed at repositioning workers' representations of the activity, generating a context of confrontation with the task. The validation of the results of this method is based on a constructive dialogue of confrontation of viewpoints among the actors, configuring a process of knowledge production and transformation of work (Ferreira, 2000).

From this perspective of Activity Ergonomics, which seeks to understand the real activity of work (Guérin et al., 2001), this article aims to identify how workers perceive and integrate quality aspects in their decisions during tomato harvesting, based on their knowledge acquired in practice. For this purpose, a case study was conducted on three agricultural properties in the interior of the state of São Paulo, Brazil, outlined from the investigation of

the constitutive aspects of the real work of pickers.

This article is organized into five sections, namely: the present section contextualizes the problem and presents the study's objective, the second section presents the theoretical framework, the third explains the method used, in the fifth section, the results are presented and discussed, and in the last part, the final considerations of the article are made.

2. Theoretical Framework

Workers rely on their knowledge and representations of what constitutes a healthy fruit to make the selection, even without formal training for it. The focus of this article is on the moment of fruit selection during harvesting, an activity carried out based on quality aspects that are tacit and learned directly in practice in a complex environment. To support this discussion, the theoretical framework is divided into two topics: manual tomato harvesting and practical knowledge; and ergonomics in agricultural work.

3. The Manual Harvest of Tomatoes and the Knowledge from Practice

Primarily cultivated on small rural properties, tomato cultivation is a significant source of employment, despite production being constantly threatened by uncertainties related to weather conditions, diseases, pests, and price dynamics (Lourenzani & Da Silva, 2004). As for fruit quality aspects, these are characterized by a set of physical, sensory, and organoleptic attributes (aroma, color, taste, and texture). This information on fruit quality is important not only to meet consumer demands but also to enable genetic improvement of new plantations, the selection of optimized production practices, and proper post-harvest handling (Geoffrey et al., 2014; Cardoso et al., 2006).

The classification of tomatoes is regulated by Law No. 9,972, dated May 25, 2000, mandatory throughout Brazilian territory by Ordinance No. 553/95 of the Ministry of Agriculture, Livestock, and Supply (MAPA), to ensure the competitiveness of Brazilian agricultural products, with lower loss rates, fair prices, better quality, and profitability, etc.

The standard for classifying table tomatoes was established by the Brazilian Program for the Modernization of Horticulture (PBMH), operationalized by CEAGESP (São Paulo General Warehouses and Markets Company), determining quality aspects, namely: color, size, shape, and the presence of defects (Ferreira et al., 2004). Through the identification of these four aspects, workers determine whether the fruit is suitable for harvesting. The identification of tomato quality aspects depends on the practical knowledge of these workers and is the guiding factor for successful harvesting.

The main forms of hiring workers in tomato harvesting are: partners, direct contracts with producers or contractors, and sharecroppers. Partners, according to Gregolis et al. (2012), are workers who, regardless of land ownership, share tasks, profits, and debts equally; in contracts with producers or contractors (known as "gatos" in this form of hiring), workers (called "volantes") are paid based on an agreed-upon price between the parties according to the profit (Tessari, 2014); and sharecroppers are workers who do not own the land and work for the owners in exchange for a share of the production, known as "meia," with all costs borne by the owner while the sharecropper carries out agricultural activities (Gregolis et al., 2012).

According to Faria & Oliveira (2005), harvesting begins, on average, 70 days after planting and lasts for 45 to 60 days (depending on the season, due to climatic variations). The authors state that the early harvests require workers to endure strenuous working conditions, as the ripe fruits at this time are at the lowest part of the plant, close to the ground, requiring them to squat with their bodies forward to reach/select the fruits. According to Bonfatti et al. (2003), the risk associated with the activity can be reduced with compensatory strategies by the workers, aiming to mitigate the exposure to risks and maintain the quality of the selected fruit.

To perform work activities, the worker needs to organize and use their repertoire of knowledge. When there is a problem to be solved or a decision to be made, the individual constructs a specific cognitive architecture, which, combined with other competencies, produces insight and resources for applying knowledge (Montedo, 2012; Montedo & Abrahão, 2015).

According to Lemos & Joia (2012) and Santos et al. (2016), knowledge can be divided into two distinct types: explicit and tacit. Explicit knowledge is characterized as easily understandable and shareable, and its transmission occurs through writing, with words and numbers, sounds, images, and videos. Tacit knowledge is presented informally, related to experience, and can be found in three perspectives: self-knowing, related to techniques; insights, such as tips; and cognitive, such as beliefs, values, and emotions.

Tacit knowledge, emphasized in this article, consists of practical development, which can be expressed as strategies, procedures, techniques, tricks, and possible solutions learned over time that are not necessarily conscious and can become difficult to verbalize (Polanyi, 1966).

The knowledge derived from farmers' practice is imbued with local reality, passed down from generation to generation, and should be valued (Santos & Curado, 2012). Thus, the Ergonomics of Activity approach, based on its premise of privileging the analysis of real work situations, allows identifying the multiple demands of tasks and the strategies adopted by individuals to manage them (Guérin et al., 2001; Wisner, 1987; Daniellou, 2004).

3.1. A ERGONOMIA E O TRABALHO NA AGRICULTURA

Agricultural work is characterized by unstructured tasks that often require considerable physical effort, uncomfortable postures, unstable environmental conditions, exposure to chemicals, seasonality, and the handling of various equipment simultaneously, leading to a wide range of risks to which workers are exposed (Montedo & Abrahão, 2015; Fathallah, 2010). Although agricultural work is considered manual labor, it is understood that by using themselves, their bodies, and their intelligence, workers learn about their trade and transform it, just as they are transformed by it, creating strategies to cope with the constraints and restrictions imposed on them (Vasconcelos et al., 2008). The study mentioned shows that in the face of the complexity of the work, these individuals can develop knowledge and create a margin of maneuver to adapt to the prescriptions arising from the task. This margin corresponds to the freedom and autonomy that a worker, formally or informally, uses to achieve results according to their strategies, turning displeasures into resources (Chatigny, 2000). Appreciating the complex perspective of these "agricultural workers," their constitutive elements, and how their rationalities manifest is essential to understand the reality of this work and to understand possible difficulties that may affect their health (Montedo & Sznelwar, 2008). To understand work activity in complex environments, such as in the case of tomato pickers, ergonomics confronts empirical data from systematic observation of behaviors, individual and collective interviews aimed at understanding the workers' representations of the task (prescribed work) and the actually performed activity (real work) (Guérin et al., 2001). Thus, ergonomics takes a closer look at the actions of these workers, identifying existing strategies as translations of their perceptions and representations (Montedo & Sznelwar, 2008). Activity Ergonomics seeks to describe work situations as well as the commitments of workers to face the constraints of their tasks and achieve their objectives (Guérin et al., 2001). Understanding work from the activity-centered perspective involves the following concepts:

- Distinction between task and activity, where a task is determined by the employer, and activity refers to what workers actually do to accomplish the task. According to Falzon (2007), studying the differences between prescription and activity provides information about the constraints to which workers are subjected and allows for the transformation of work to eliminate or limit the undesirable effects that affect the worker or the task.
- Variability is associated with the unforeseen or what has not been predicted or manifested within productive situations. The concept of variability is divided into two approaches: company variability (random factors in production or service delivery) and individual

variability (factors related to differences between individuals or within the individual) (Guérin et al., 2001; Daniellou & Béguin, 2007).

- Workload, according to Guérin et al. (2001), is associated with the fraction of the worker's capacity invested in the task. This concept can be analyzed by understanding the margin of maneuver available to the worker to develop operational methods to achieve the required objectives without unfavorable effects on their health.
- Operational Method arises from the previous concepts and represents the individual response to the determinants of a work situation. The concept of operational method can be understood as the worker's action planning to achieve both the company's and their own objectives.

Using the ascending approach to work analysis and the foundational concepts, ergonomics identifies competencies that are transferred and mobilized by workers, enabling an understanding of their development and, consequently, promoting favorable working conditions and the process of creating new knowledge (Daniellou, 2004).

4. MÉTODOS

To analyze the importance of the tacit knowledge of workers involved in agricultural practices and how it serves as the basis for manual tomato harvesting, a case study was conducted in three selected agricultural properties in the interior of the state of São Paulo, Brazil.

The research is exploratory in nature, focusing on the representations of individuals in a specific context (Yin, 2015). The research is primarily qualitative, based on the analysis of workers' discourses to identify tacit knowledge developed in the work activity.

The research was guided by the Activity Ergonomics approach, conducting a comprehensive analysis of the studied properties and their workforce, task analysis, and analysis of observations and interviews with workers about the activity.

The study began by familiarizing itself with the properties and understanding the environment in which the workers were situated. Subsequently, the characteristics of tomato production, the worker population, and the stages of the task were analyzed through free observations and semi-structured interviews. These methods allowed for the identification of the adequacy of the decision-making processes of the workers. The research was organized into four stages, as outlined in Table 1.

Table 1. Study Steps

Steps	Details of the steps
i. Initial Contacts	Explanation of the study's structure and objective; Scheduling of visits.
ii. Global Characterization	Comprehensive Analysis of Properties; Collective presentation of the study to the workers; Signing of the Informed Consent Form; Exploratory Observations
iii. Data Collection	Observations of actual work; Semi-structured interview; Self-confrontation journey.
iv. Data Analysis	Transcription of speeches; Categorization of speeches; Comparative analysis based on literature; Development of mind maps.

4.1. Characterization Of Properties And Sample

Three small tomato-producing agricultural properties located in different cities in the interior of the state of São Paulo were studied. The selection criteria were as follows: a) signing of the Free and Informed Consent Form (FICF) by all workers on the property; b) recordings and transcriptions of speeches with higher quality (audible even with wind interference); and c) ease of access to producers and workers for data collection.

The studied properties will be referred to as follows: agricultural property 01 (P01), agricultural property 02 (P02), and agricultural property 03 (P03). All properties are leased and have only one portion dedicated to tomato production, with the rest of the land directed to the cultivation of other products such as beans, watermelon, corn, peaches, bell peppers, grapes, etc. Similarly, the planting density was similar in all three properties.

In all analyzed agricultural properties, tomatoes were classified according to the planting and harvesting process: staked and ground. The ground tomato has a soft and flexible stem that grows on the ground. The staked tomato, on the other hand, grows with staking, staked so that the stems can support the weight of the fruits vertically (Camargo Filho et al., 1994).

Regarding hiring practices and profit sharing among workers, P01 had 10 siblings who equally shared the profits according to the portion they harvested (partners). P02 was leased by a producer, and the workers present during the harvest were contracted by a labor contractor (contract by contractor). P03, on the other hand, had sharecropper workers who did not legally own the land and engaged in agricultural activities for the owners in exchange for a share of the production (sharecroppers). In Table 2, the main identified characteristics are compared.

Table 2. Description of Analyzed Agricultural Properties

	P01	**P02**	**P03**
Total property size	29 hectare	36 hectare	14 hectare
Parcel of land leased for tomato production	02 hectare	02 hectare	1,25 hectare
Number of workers	10	15	04
Number of tomato plants	12.000 pés per hectare	12.000 pés per hectare	11.000 per hectare
Number of boxes per harvest (estimate)	3.300 boxes per hectare	3.300 boxes per hectare	3.000 boxes per hectare
Number of boxes harvested in one day	500	300	300
Type of tomato	Déborah	Italian	Déborah
Planting method	Envarado	trailing	Envarado
Hiring method	Partnership	Hired by the contractor	Sharecropper

The sample of workers studied consisted of 23 subjects, predominantly composed of men, who represent 78% of the group. Regarding education, 60% of the workers had incomplete elementary education. None of the workers participating in the research received any formal training related to tomato harvesting or had technical training in agricultural activities.

Across all observed properties, no training of any kind was identified. Learning among

workers was transmitted cooperatively, with more experienced individuals explaining the specifics of harvesting and other aspects of cultivation to newcomers, as well as setting the pace for the harvest.

5. Results And Discussion

5.1. Observations On The Prescribed Work

The prescribed work is primarily composed of elements defined by the organization, guiding the way work is carried out. In all the properties studied, the workday depended on the presence of sunlight. Workers arrived at the workplace in their own vehicles or were brought by contractors, and collectively set their work pace, organizing themselves during the tomato box harvesting. Specific details of the tasks performed by these workers are described in Table 3, based on the collected data.

Table 3. Tasks Performed During Tomato Harvest

Arrival at the location	Arrival via own transportation or brought by the contractor
	Storing food (lunchbox, cold meals) in a shaded area
	Collecting specific PPE (mask and gloves)
	Gathering storage devices: cart, boxes, and buckets
Beginning of the harvest	Moving (on foot) among the tomato plants to start harvesting
	Bringing the body closer and moving leaves aside to locate the fruits
	Using touch and sight, selecting the fruit on the plant: if the fruit is suitable (quality), picking it by hand; if the fruit is not ripe, leaving it on the plant; and if the fruit has defects, removing it from the plant and discarding it on the ground. The action of discarding is communicated to the producer.
Filling of the boxes	Placing the box on the cart and emptying the bucket into the boxes

While the workers harvest the fruits, they also identify the presence of diseases, insects, mechanical injuries, pests, and nutritional problems that may occur with the fruit. When they identify such issues, they discard the affected fruits and notify the producer (either directly or through the contractor), who then takes necessary measures to prevent the identified problem from affecting other fruits. Workers also check the irrigation, which is done by drip irrigation during the harvest, ensuring, for example, there is neither a lack nor excess of water.

Harvesting is conducted according to the order of planting, birth, and maturation of the fruits. Workers visually identify where they stopped the harvest the previous day and start from that point, filling the collection boxes while there is sunlight.

Harvesters move on foot through all the tomato plants to perform their task and spend most of the workday alternating between squatting and anterior flexion of the spine with semi-flexion of the lower limbs to reach the fruits in the lower parts of the tomato plant. They only sit during their breaks, which they have the autonomy to take when necessary, although they avoid it to maintain productivity.

In the midst of a variable environment, workers develop their operational methods based on the mental representations they have about what constitutes a healthy fruit suitable for harvesting. These aspects are formed through learning from colleagues and through their own practice. They can visually inspect and touch the fruit and, among various characteristics, identify which ones are suitable or not and what caused the defects. Figure 1 shows a harvester indicating that despite tomatoes having different shades (red, pink, yellow, or orange), all are classified as suitable for harvesting.

Figure 1. Selected fruits

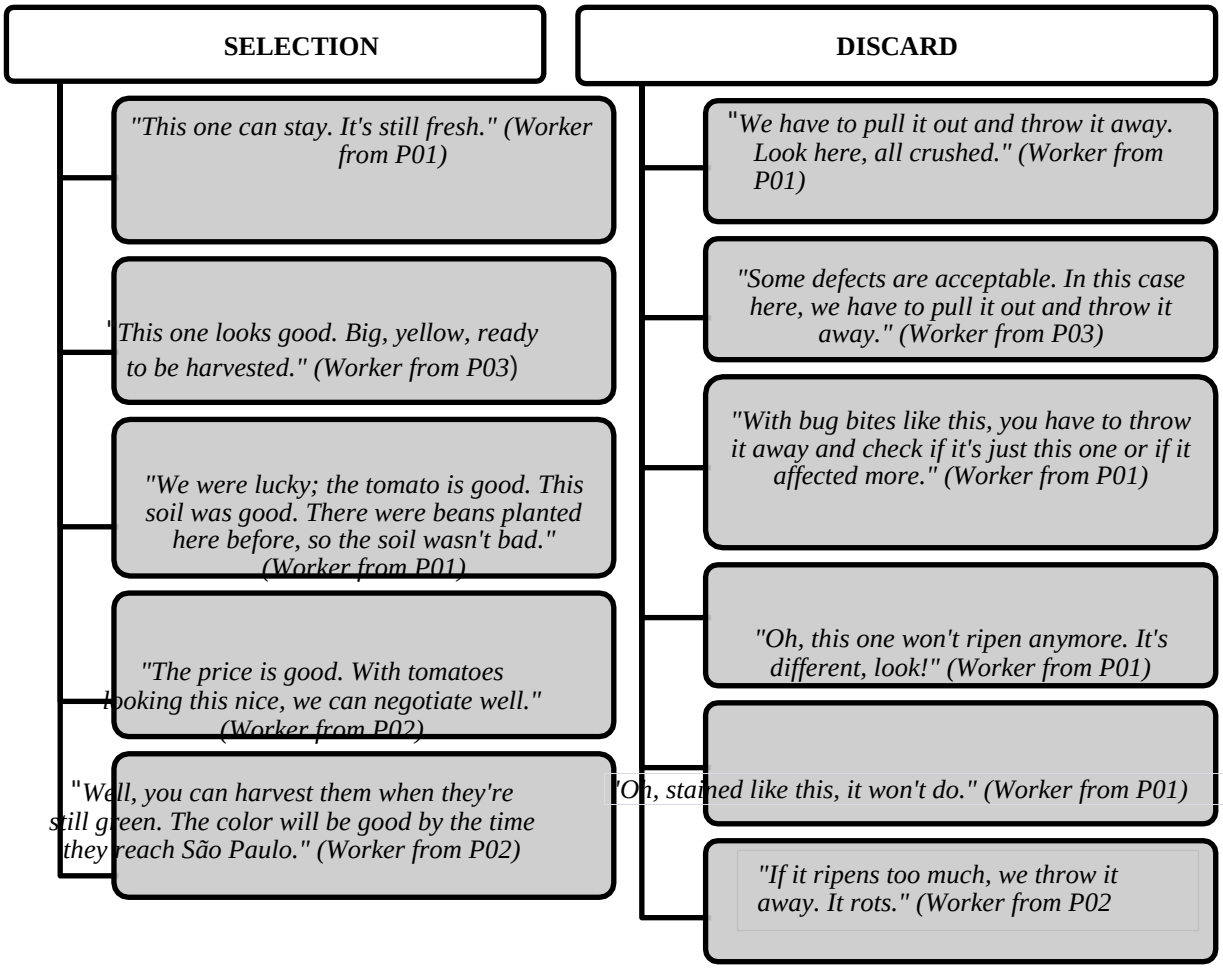
The analysis of the interviews reveals that in the activity, workers make decisions based on a model they construct regarding the perceived quality characteristics. The harvester builds a mental map, a representation of what constitutes a fruit suitable for harvesting. This representation encompasses various multisensory information, whether perceived through touch or visual aspects.

Workers assess quality aspects such as color, degree of ripeness, and size, in addition to recognizing the presence of defects—a knowledge widely shared among them. It was observed that these workers have a mental image with which they make a comparison, and in their decision tree, they determine what to do with each fruit based on these criteria.

5.2. Observations On The Actual Work

A analysis of the activity revealed that the harvesting work goes beyond just picking tomatoes. Based on the formed mental image, three action groups occur: i) Harvest: they select and pick the fruits from the plant that are at acceptable quality levels for sale; ii) Keep on the plant: tomatoes that have not reached the ripening stage or have small defects that can be corrected with nutritional support are kept on the plant; iii) Discard: fruits that do not depend on time (ripening) or nutritional care are removed from the plant and discarded. In this last action, workers also identify nutritional or defense needs, reporting their findings to their supervisors: upon noticing the presence of diseases or defects they identify as nutritional, the producer is alerted to apply the necessary chemicals and/or fertilization for fruit recovery. Figure 2 presents a selection of workers' verbalizations, showing these action groups related to fruit selection or discard.

Figure 2. Verbalizations on fruit quality aspects



It is noted that there is no wealth of details regarding quality aspects. Tacit knowledge is evident in the obvious, in the challenging verbalization of what is already natural in their routine.

Comparing the workers' quotes with the official information from CEAGESP and MAPA's regulations regarding quality, it is observed that the workers make the same selection and consider the same criteria, but use different terms informally (CEAGESP, 2000). The fruit destined for the boxes follows the selection criteria formally listed in these two references, which, however, are not known to these workers, who have learned directly in practice how to differentiate and classify the product.

According to the harvesters, the more fruits they see, the more they learn about the nuances of shades, colors, and defects. This learning occurs through comparison between fruits, where mental references gather more examples to build the mental model of what is an adequate fruit and associate defects with their possible causes.

Since this tacit knowledge constitutes a difficult-to-verbalize knowledge, there is a limitation in its ability to be transferred through formal language. An individual may know how to do something without being able to articulate it to others in greater detail (Lemos & Joia, 2012).

During the harvest, harvesters need to select the fruits directly on the plant (SIGEI et al., 2014). Often, especially in the case of ground tomatoes, these fruits are under foliage, making it difficult to visualize. Thus, workers need to harvest the fruit after feeling it, identifying by size and firmness if it has reached ripeness. After removing the fruit from the plant, they visually analyze it to identify other quality aspects related to color and possible irregularities arising from diseases, nutritional problems, or mechanical issues.

> *By looking at them, we can see that these more orange tomatoes will turn red over time. If they are very red now, they will arrive soft in São Paulo. So, we have to harvest the ones that are not so red.*

In this verbalization, it is possible to notice that the workers are familiar with and anticipate other stages in the tomato production chain, as they consider the transportation process in their decision-making regarding which fruits to harvest or discard. The workers discern differences in fruit quality aspects that guide their choice. The harvester must build a mental map, a reference in their mind, of what constitutes a suitable fruit for harvesting. This representation carries various multisensory information. The reference for the suitable fruit for harvesting begins with a perceptual process and then undergoes a cognitive process, as we have seen in our theoretical framework (OUELLET and VÉZINA, 2008).

The aspects of the fruit are directly related to the actions of the workers during harvesting. By visually inspecting the fruit and feeling them with their hands, the workers choose among three strategies: harvesting the fruit, leaving it on the vine, or discarding it (after identifying the cause of the defect that prevented it from meeting their quality criteria). The choice of fruits that align with quality aspects is made within seconds, and all workers make decisions based on the same quality criteria.

Workers associate the color with the degree of fruit ripeness. Coloration appears as a visible aspect that indicates when the product is healthy and ripe for harvest. Harvesters visually and tactilely analyze the size and mass of the fruit, and the order of vision and touch can invert in the case of ground tomatoes.

Observing the size, they identify which fruits have reached the appropriate dimension for harvest - according to the degree of ripeness - and note if there were nutritional problems during the fruit's growth. Workers recognize that larger caliber fruits reflect the success of care during planting.

When asked about "how they learned," responses such as "doing," "looking," and

"colleagues taught me" were common across all properties. The cooperative environment among people and practical learning becomes a tool for autonomy in knowledge construction.

It is evident from the discourses that harvesters relate the ripeness of the tomato not only to color and size but also perceive variations among fruits, due, for example, to nutrient absorption, water intake, and exposure to the sun.

> *"The tomato plant produces a lot of foliage. The tomatoes stay beneath them, protected from the sun. Some don't get any sun at all and are farther from the vine, taking longer to absorb water and fertilizer." (Verbalization from a worker at P01).*

The workers use terms like 'very red' to associate with tomatoes that have exceeded the appropriate degree of ripeness for harvesting. According to the workers, these ripe tomatoes lose firmness and are not accepted by the market in the state of São Paulo or are sold at a very low price.

They associate each defect with a cause, creating strategies for anticipation and combating future cases. When identifying problems, they seek immediate correction and inform the responsible producers so that control measures (fertilization and/or application of agricultural pesticides) can be carried out. These actions highlight that, in addition to being harvesters, the workers also act as caretakers of the plantation, something not explicitly mentioned in the initial task.

Regarding the size of the fruit, nutrient deficiencies or inadequate irrigation can prevent the fruits from developing and growing with less pulp, symptoms of which were also observed and reported.

In one of the properties, upon detecting these defects, a worker reported being able to find larvae among the leaves.

> *"There are bugs that leave a lot of little holes. This here was a larva that got in. Look. There's only one hole, and it's deep. The leaf gets dry where it passes while eating. When we find a wetter leaf, we find the larva." (Verbalization from a worker at P01).*

The worker looked between the leaves and, through this mental representation, managed to find the larva that was among the fruits causing defects. When asked how he had developed this skill, he responded:

> *"It's just by seeing every day, really. We learn by watching. One day, my brother showed me. I didn't believe he had found the bug. Today, I see that it's easy. The leaf gets eaten and dries up; you just have to follow the trail."*

When asked about "how they learned" about any aspects inherent to harvesting, responses such as "doing," "observing," and "colleagues taught me" were common across all properties. Seeking to outline this knowledge, Table 4 displays selected verbalizations that refer to the operative mode of fruit selection, identifying aspects indicating quality fruit, as well as the mental associations workers use in their decision-making process. In the first column are the general quality concepts that should be assessed during harvesting. In the second column are technical references and scientific literature that underpin the theoretical criteria for tomato quality during the production process. The last column displays the workers' verbalizations indicating how they select pertinent information to construct their mental process, allowing them to reach a relevant and situated decision.

Table 4. Formal and Tacit Quality Criteria in the Harvesting Process

INDICATORS	**QUALITY CRITERIA**	**PERCEPTION**
		"The tomato can't be too red. See here? You have to pick it when it's a bit green because it ripens on the way to São Paulo." (Worker from P01)

Coloration and Ripening (sight)	Green, ripe, painted, pink, red, and fully red (CEAGESP, 2000)	*"It took me a while to see the difference, but you can tell. Look here! This one is a bit yellow. It's good." (Worker from P02)* *Parte superior do formulário*
		"There's a very bright red, almost wine-colored. That one is spoiled. Now, this one here is almost orange. When it's like this, in this red, leaning towards yellow, it's good." (Worker from P03)
		"The color shows if it's ripe. But it can't be too ripe." (Worker from P02)
Shape (touch and sight)	Oblong (when the longitudinal diameter is greater than the transverse), also called "Italian." Round (when the longitudinal diameter is smaller or equal to the transverse), also called "Débora" (Ferreira et al., 2004; CEAGESP, 2000).	*"Some small dents are fine; no problem. It's just the really squished ones that need to be thrown away." (Worker from P02)* *Parte superior do formulário*
		"The 'Débora' is more flattened." (Worker from P01)
		"The Italian tomato is more pointed." (Worker from P02)
		"It's not possible that you don't see that this one is different from that one. Look here: it's rounder." (Worker from P03)
Size (touch and sight)	Small (between 50 and 65 mm); Medium (between 65 and 80 mm); Large (above 80 mm) (CEAGESP, 2000)	*"Look at this one, how beautiful! Large! Take a bite to see how good it is." (Worker from P03)*
		"This one is the right size, see! I can't explain... This one is different from the small ones." (Worker from P02)

A collaboration at work occurs both during the harvest and in the transmission of knowledge. These trust-based relationships favor the establishment of common learning by workers, with terms and language unique to them, which, in turn, are embedded in the culture of these workers. Thus, the cooperative environment among people and practical learning become tools for autonomy in knowledge construction.

Regardless of the job, there will always be a need to describe and understand all components of workers' actions broadly to reach the actual content that represents the work and is related to the development of competencies in knowledge transmission (Ouellet & Vézina, 2014).

The prescribed work highlighted that for tomato harvesting, there are a series of quality-related prescriptions, some of which are formalized in documents. On the other hand, the analysis of real work, from the perspective of activity ergonomics, showed that these criteria were translated into signs that guide decision-making. It is a mental representation, a map for action that allows the use of visual and touch-related aspects on the tomato to harvest, keep on the vine, or discard a tomato, as well as identify possible needs for special care in a specific plant.

6. Final Considerations

This research employed the activity ergonomics approach to present an empirical case on the importance of valuing the use of tacit knowledge in agricultural activities, considering the specificities of tomato production. It also examined the ways in which knowledge is transmitted in the manual harvesting labor practices, including the experiences of the harvesters, methods of referencing for the construction of mental maps to assess fruit quality, and the practical learning of the workers.

The tacit knowledge elucidated in the activity analysis reveals that agricultural workers play a crucial role in selecting situated actions and strategies developed to address constraints arising from the work. In the absence of formal training, knowledge is acquired practically and spontaneously transmitted among the workers.

Between the externally defined formalizations of work (prescribed work) and the actual work in tomato harvesting, there exists a repertoire of tacit knowledge (learned and developed primarily in a situated manner) that workers draw upon to perform the activity. It can be concluded that workers make the same selection and consider the same quality criteria formalized in manuals from CEAGESP and MAPA, even without knowledge of these documents or receiving formal technical training on them. They use the construction of mental maps, created from multisensory information, to indicate the suitable fruit for harvesting, assist in discard decisions, and guide maintenance of the fruit plants.

The cooperative aspect among workers proved to be crucial in carrying out the work and transmitting acquired knowledge. Despite being individually remunerated per harvested box, workers in all properties chose to work in groups, in an environment of mutual assistance and learning.

The contribution of the article lies in emphasizing the value of agricultural work amid the increasing precarization and automation of labor. Workers need autonomy to organize collectively and systematically transmit their knowledge, considering and valuing tacit knowledge learned in practical, real work situations.

As a limitation, the analysis was limited to a small number of properties. Future research could examine a larger number of cases and compare these and other results related to tacit knowledge in the actions of tomato harvesters.

8. References

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