



RESEARCH PAPER

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Supply scenario of organic vegetables, problems and constraints: Basis for a proposed planting calendar for organic vegetable farmers in the Cordillera administrative Region, Philippines

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Abstract

The research analysed the supply scenario of organic vegetables and the challenges that stakeholders face which were used as basis for a proposed planting calendar for organic vegetable farmers since production planning is a crucial element in food production, sustainable agriculture and food security. Survey method using a researcher-made questionnaire was utilized to elicit data from thirty one (31) farmer-respondents. The secondary data used to analyse the supply scenario was obtained from the La Top Cooperative. Descriptive statistics like frequency counts, percentages and means/averages were used to qualify and summarize data. Leafy vegetables such as lettuce, pechay and spinach were the most traded vegetables. Volume of trade peaks towards the start of the second quarter of the year. Highest pull-out rate is registered during the month of April when volume of trade is also highest. Supply of Baguio/Snap beans, broccoli, cabbage, lettuce, pakchoi/chinggang pechay, potato, Japanese spinach, and tomato reach their highest peak in March. Supply of carrots, cauliflower, flowering pechay and New Zealand spinach starts to rise during the last quarter of the year. Low or zero pull-out rates are noted during the third quarter of the year. Oversupply, unstable production supply and pull-out or spoilage are most common constraints that affect the production of organic vegetables in the CAR. A planting calendar is proposed to serve as basis for farmers to plan their production to address the problem of oversupply and high rates of pull-out or spoilage and make production more responsive to market needs.

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Introduction

The Agriculture and Fisheries Modernization Act of 1997 was evaluated in terms of achieving its food security objectives. It was concluded that the various indicators of its food security dimensions, i.e. utilization, stability, accessibility and availability, showed that the Philippines is yet to achieve food security (Philippine Institute for Development Studies, 2023). Food security is defined by the 1996 World Food Summit as “when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

According to the USDA, food insecurity, which is often rooted in poverty decreases the ability of countries to develop their agricultural markets and economies. It is recognized that growth in the agriculture sector is effective in reducing poverty and that access to quality, nutritious foods is fundamental to human existence impacting economic growth and job creation and poverty reduction.

Organic farming was studied to affect food security and that market orientation positively moderates their relationship (Ume, 2023). Farmers who adopt and practice organic farming would have a positive impact on food security and the effect would be higher if the farmer’s practice of organic farming is geared towards satisfying market demand.

In the Philippines, food security is a major goal of the Department of Agriculture. The production of crops to at least a sufficiency level is a sensible target. Alongside this goal are perennial issues that farmers continue to experience affecting their livelihood.. These include but not limited to low-priced vegetables, alleged oversupply, and dumping. Participation of small farmers in the market is vital in the transformative role of agriculture in attaining economic growth, food security and poverty reduction (Zhang *et al.*, 2021).

The Cordillera Administrative Region (CAR) is an undisputed supplier of highland vegetable in the

country. During the first semester of 2022, it has produced 142,030.5 MT of vegetables from an area of 8,295.7 hectares. On the average, Cordillera sells around 1,000 metric tons (MT) or 1 million kilograms of vegetables a day. Computed at an average of Php30 per kilogram of vegetables, around Php30 million is helping propel the economy, every day. Eighty one percent (81%) of the Region’s produced comes from Benguet, accounting 115,510.4 MT (PSA, 2022).

The Department of Agriculture (DA-CAR) recognizes that the Region is contributing largely to the production of food that feeds everybody in the country. A high ranking official of the Department has said that the agricultural sector is a critical component of the economy whose efforts must be continued and sustained to ensure food availability and security (Agoot, 2021). In the early part of 2024, we saw posts on social media and read news articles about vegetables being sold at very low prices, given for free, dumped or left to rot. It is imperative for stakeholders to address these issues.

One of the factors that need to be studied in this situation is the supply-demand scenario since supply changes in response to market demand. A study by Fronza (2022) has noted that the availability of produce-vegetables was determined by the farmers’ adherence to the vegetable calendar and the planting season. Sometimes, supply was limited because the produce was infested before being harvested. Oversupply occurs when other products from other areas are transported in the same location and when farmers from different cities plant the same vegetables, so during the harvest season, supply overflows causing decrease in price.

This research looked into the supply scenario of organic vegetable production in the CAR as well as its problems and constraints to serve as basis for a proposed planting calendar for organic vegetable farmers. Food production has been identified as a factor that affects food security. The production of food is affected by agriculture practices, among others. Hence, production planning is a crucial

element in food production and sustainable agriculture. The production decisions made by farmers and fishermen has an impact on the food security condition of the country (Espineli, and Ebo, 2017).

Materials and methods

Project sites and respondents

The study was conducted in the CAR, specifically in the province of Benguet. The Region consists of the provinces of Abra, Apayao, Benguet, Ifugao, Kalinga and Mountain Province and the highly urbanized city of Baguio. With an elevation of 2,928 meters above sea level, the CAR is the only land-locked region in the Philippines. It produces 65% to 80% of the Philippines' supply of temperate-climate vegetables mainly potato, cabbage, beans and carrots (Gimenez & Bagyan, 2004).

The study's respondents consisted of 31 certified organic vegetable producers who were all members of the La Trinidad Organic Practitioners (La Top) Multi-Purpose Cooperative. La Top (henceforth referred to as the Cooperative) is a certified organic vegetable producer certified by the Organic Certification Center of the Philippines. La Top is one of numerous multi-purpose cooperatives and peoples organizations in the CAR organized mainly for the marketing of products like Arabica coffee, heirloom rice and vegetables. The 31 respondents consisted of the 20 originally certified members and 11 members who were in the process certification. At the time of the study, the Cooperative has 55 members, 20 were certified and 35 in the process of certification. The study was delimited to this number. The study intended to involve all the 55 members but due to time limitation as well as the accessibility of the organic farms, only 31 farmers were included.

Data collection and analysis

Survey method through the use of a researcher-made questionnaire was the primary data gathering tool. The survey was done by personal interviews and ocular inspection of the organic farms for a first hand

observation of the farm practices. Telephone inquiries or short messaging system (SMS) were also utilized when some information were missed out during the interview and to verify vague and incomplete information.

Secondary data on the volume of production for the year under consideration (2012) was obtained from the Cooperative.

Descriptive statistics was used to qualify and summarize descriptive data. The descriptive part defined, assessed and analysed the monthly production volume, the problems and constraints in production. Tools used in descriptive analysis included frequency counts, percentages and means/averages. Findings are presented using figures and tables.

Scope and limitation of the study

Data used in the analysis of the supply scenario and production volume are limited to the data provided by the Cooperative. The volume of the vegetables considered in this study are only those produced by farmer-members of La Top which is traded by the Cooperative in the market. Although there are numerous cooperatives and peoples associations in the CAR which are engaged in organic production of vegetables, it must be emphasized that La Top is the only certified practitioner at the time of the study. The study was focused on the production and trade of eleven (11) commodities, namely: beans (*Phaseolus vulgaris*), snap bean and French bean varieties), broccoli (*Brassica oleracea var. italica*), cabbage (*Brassica oleracea var. capitata*), carrots (*Daucus carota subsp. Sativus*), cauliflower (*Brassica oleracea var. botrytis*), cucumber (*Cucumis sativus*, native and Japanese cucumber varieties), lettuce (*Lactuca sativa*, fancy varieties), pechay (*Brassica rapa subsp. oleifera* and *Brassica rapa subsp. chinensis*), potato (*Solanum tuberosum*), spinach (*Spinacia oleracea* New Zealand and Japanese spinach varieties) and tomato (*Solanum lycopersicum* big and cherry tomato varieties).

Results and discussion

Volume of selected organic vegetables traded

Fig. 1 presents the volume of selected organic vegetables traded by the Cooperative in 2012. It can be seen from the figure that the top five (5) vegetables traded by the Cooperative are lettuce, Baguio/snap beans, carrots, pakchoi and chingkang pechay varieties and New Zealand spinach with volumes from 3000 to 9000 kilograms. Noticeably, leafy vegetables are among the most traded in terms of volume because these are the easiest to raise requiring very short periods of production. Production period for leafy vegetables is only over a month, on the average. Beans and pechay are also among the cheapest of the vegetables under study making them affordable to the average consumer. Lettuce is a salad vegetable that is increasingly being used for sandwiches, which accounts for its high marketability. Spinach has also found its way into the Filipino diet since this is also eaten raw as salad or used as garnishing for sandwiches and other recipes. The high demand for carrots is attributed to its proven nutritive value. Carrots, aside from being a salad ingredient is also increasingly being served as juice.

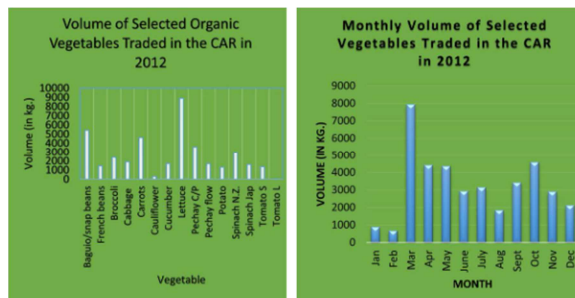


Fig. 1. Volume of selected organic vegetables traded in the CAR in 2012

The least traded in terms of volume are large tomato, cauliflower, potato, cherry tomato, and French beans. Only a few of the farmers plant the large tomato variety preferring to produce the cherry variety. Production though is yet to scale up. Only a few of the farmers raise cauliflower probably because it has a long production period. The same could be true to potato, aside from the fact that there is limited requirement for organic potato from consumers.

French beans is one of the two most expensive vegetables included in the study. This makes it less affordable. This could be the reason why it is not yet being extensively produced by the Cooperative members.

The figure also shows that there is a high volume of trade in the months of March, April and May which gradually decreases only to rise again in the month of October. It is towards the second quarter of the year that the farmers actually harvest the produce they planted when the temperature starts to decrease.

Pull-out rate of selected organic vegetables traded

Pull-out refers to the volume of vegetables which were put in the market or delivered to the Cooperative or its retail stores but were not sold after a certain period of time because they already manifested signs of decay or spoilage and thus were “pulled-out” by the farmer or trader. It is also referred to as spoilage or bad order.

Of the total volume of selected vegetables that the Cooperative traded in 2012, carrot is seen to be the most unsold with more than 20 percent returned to the farmers (Fig. 2). If carrots are made into juice, it is best to juice them at their freshest form. Probably, customers are no longer interested to buy carrots if it already show signs of rotting. The Cooperative is not able to extend its shelf life because of unfavourable temperature conditions of its retail stalls. Among the vegetables in the study, rootcrops have the longest shelf-life. This includes potato and carrots.

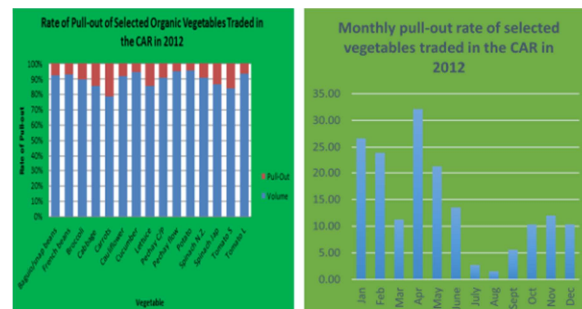


Fig. 2. Rate of pull-out of selected organic vegetables traded in the CAR in 2012

The other vegetables which have between 11-20 percent pull-out rates are cherry tomato, cabbage, lettuce and Japanese spinach. Of these vegetables, two belong to the most traded to the Cooperative in terms of volume during the said year. These are carrots and lettuce. This result shows that there is oversupply of these vegetables during the period. This is compounded by the unavailability of chillers at the retail stalls which could have extended their shelf-life especially lettuce which is highly perishable. This could also be true to the other vegetables especially the leafy ones. Under normal room temperatures, cherry tomato also rots easily compared with the larger variety. Although cabbage's shelf-life could be extended by trimming the cover leaves, there could be an oversupply which accounts for its high pull-out rate.

Those which have between 6-10 percent rates of pull-out are broccoli, pakchoi and chinggang pechay, New Zealand spinach, cauliflower, snap beans, French beans and large tomato. Minimal amounts (five percent or less) of pull-out are noted in cucumber, flowering pechay and potato. Next to leafy vegetables, broccoli and cauliflower are considered to be highly perishable showing brownish spots after several days, making them unattractive to buyers. Between the two pechay varieties, flowering pechay is more saleable than pakchoi and chinggang while New Zealand spinach is sold faster than the Japanese variety. The large tomato variety lasts longer than the cherry variety because it has a thicker pulp. Aside from this is, only a few farmers actually produce this variety preferring to raise cherry tomatoes. Among the crops, potato, being a root crop, is expected to last the longest.

Pull-out rate is highest in the month of April, when supply is also highest, as earlier noted. It is lowest in the month of August when production is low since it is already the rainy season.

Monthly trade volume of selected organic vegetables

The trade of organic vegetables at any given month in 2012 is shown in the figures that follow (Figs 3 to 17).

Baguio beans or snap beans

The biggest volume of this bean variety was traded during the month of March. Supply declined abruptly in the succeeding months until it reached a low point in the month of August (Fig. 3). It was during this month when no pull-out was recorded implying equilibrium in supply and demand. Supply started to rise again in the last quarter of the year. The highest pull-out rate was registered during the months of April and May. In April, the pull-out rate reached more than a third of the supply. During the rest of the year, pull-out rate averaged at 10 percent registering the lowest in June. The high pull-out rate in April could be because there was an oversupply in March that was not disposed until the following month. Almost eight (8) percent of the supply of the product in 2012 was unsold.



Fig. 3. Trade of Baguio/snap beans in the CAR in 2012

French beans

There seems to be an unstable supply for French beans as seen in the graph where fluctuations in supply are noted. Supply was highest in April and March but this declined in May only to rise again in June and July but the volumes are not as high as those registered in March and April. The lowest supply was noted in October only to rise again by almost 700 percent in the following month (Fig. 4). Supply exceeded demand in April accounting to a high pull-out rate during the month (the second highest for the year). In the months of June, August and September, there was almost no pull-out which implies that production during those months were

just enough to fill the demand. In February, no pull-out was registered but the total volume was the second lowest for the year. French beans are among the products under study which is saleable considering its low pull-out rate of six (6) percent.

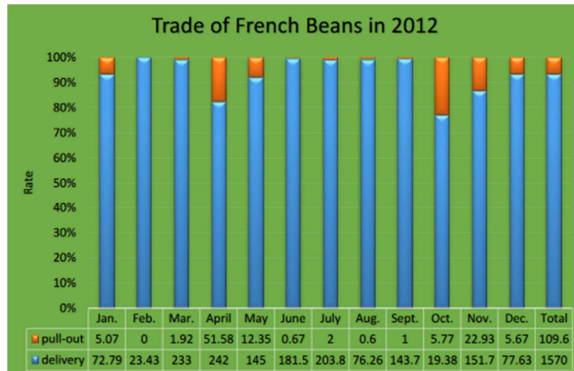


Fig. 4. Trade of French beans in the CAR in 2012

Broccoli

The biggest supply was registered in March but this resulted in an oversupply since it was during the month that the highest pull-out rate was noted which was almost 30 percent (Fig. 5). Supply declined gradually in the succeeding months until it reached a low level in August only to rise again until October. Volumes were lowest in February and January only to rise abruptly at its highest in March. It was during these months, probably that the crops were about to be harvested. Though supply was already low in January, there was still little demand for the crop as implied by the high pull-out rate which was the second highest for the year. The lowest pull-out rate was registered in August when supply was starting to rise again. About 10 percent of the broccoli traded in 2012 was unsold.

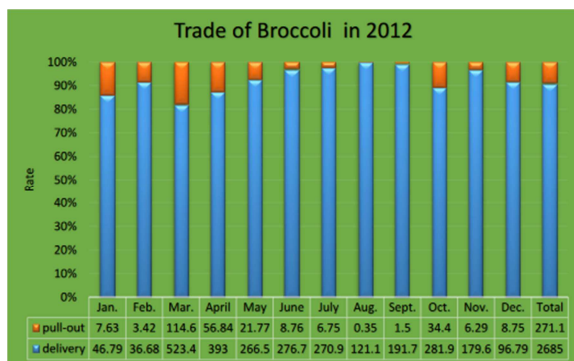


Fig. 5. Trade of broccoli in the CAR in 2012

Cabbage

It can be noted that there is almost a steady supply of this crop throughout the year starting from the onset of the dry season in March. A slight decline was noted in August and September probably as a result of the heavy rains and typhoons that occurred during those months. However, supply increased again in the next two months only to decline until February which are the dry cold months of the year (Fig. 6).

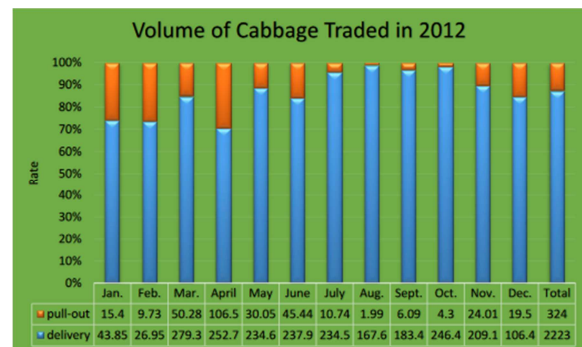


Fig. 6. Trade of cabbage in the CAR in 2012

The highest pull-out rate was noted in April in which the second highest supply was registered. This means that there is oversupply of green cabbage during this period. At the time when supply was at its lowest in January and February, there was also a very high pull-out for the crop which may mean that there was little demand for the crop during these months. This may also mean that green cabbage decays easily during these cold months thus it is not saleable. The lowest pull-out rates which range from 1-3 percent occurred from August to October which implies that supply almost equalled the demand during these months. Around 15 percent of the supply of cabbage in 2012 was unsold.

Carrots

The supply for carrots was highest during the months of April and December but an oversupply occurred in April because it was during this month that the highest pull-out rate reaching 40 percent was registered. In fact, pull-out rates were highest during the second quarter when supply started to experience a decline. Very low production was noted during the first two months of the year but rose abruptly when

March came. This could mean that most of the farmers plant carrots simultaneously, thus, they harvest at the same time starting in March resulting to high supply during this period (Fig. 7).

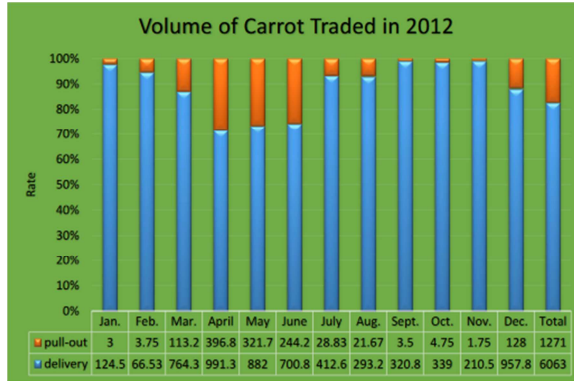


Fig. 7. Trade of carrots in the CAR in 2012

Pull-out rates were lowest from September to November when supply was generally lower during the year. This implies that supply was just enough to fill the demand for carrots during the period. About 1/5 of the supply of carrots was pulled-out in 2012.

Cauliflower

Generally, there is a low volume of production for cauliflower in 2012 which made supply erratic throughout the year. Supply reached maximum in the month of June only to drop suddenly in the next two months and rises again the following months until it reaches its lowest levels until February (Fig. 8).

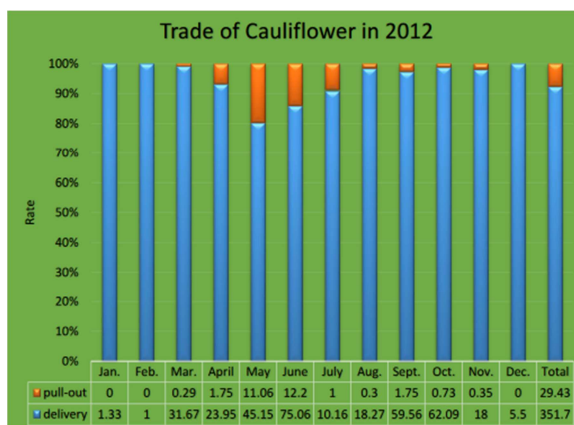


Fig. 8. Trade of cauliflower in the CAR in 2012

It starts to rise again during the summer months. However, it is also during this period that the highest pull-out rate of almost 25 percent is registered.

Actually, it is during this period that pull-out rates are highest for the year. Eight percent of the supply of cauliflower in 2012 was unsold. During the months when supply is very low, everything is sold. There could be shortage of cauliflower supply during these months that La Top is unable to fill in.

Cucumber

In 2012, La Top was only trading native cucumber variety. The trade of Japanese cucumber started only in 2013. Thus, was not included in the data obtained from the cooperative (Fig. 9).

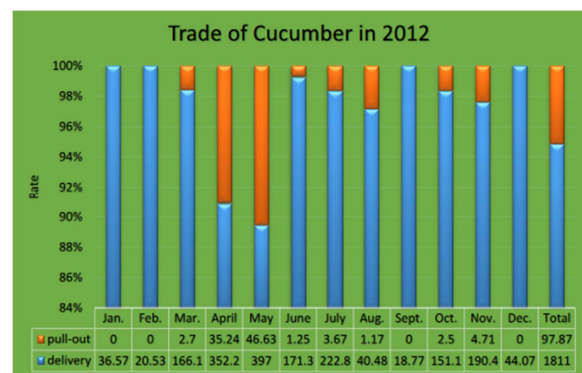


Fig. 9. Trade of cucumber in the CAR in 2012

The supply of cucumber in 2012 was generally erratic showing fluctuating trends. It reached its highest level in May only to drop in the following month and rose again in July only to drop suddenly in August until it reached its lowest level in September. Supply increased again in the last quarter only to drop in December continuously until February. In March, the supply started to rise again.

Cucumber seem to be a very saleable product as evidenced by the pull-out rates that range only from less than one (1) percent to about 12 percent. In fact during the months when supply was low, no pull-out was registered. There could even be shortage during these months. Though minimal, pull-out was highest when supply was also highest. Only five (5) percent of the total product traded in 2012 was unsold.

Lettuce

This is the most traded vegetable in the CAR at any given month in 2012 but the volume was fluctuating.

The highest volume was recorded in March but slowly declined in the next two months until it dropped sharply in June but rose and dipped again in the following months. There was a recorded increase in volume in September and October but this slowly declined towards the colder months until it reached its lowest point in February. The farmers seemed to time their production during the cooler months in time for harvest before the onset of the hot summer months where supply takes a sharp ascend (Fig. 10).

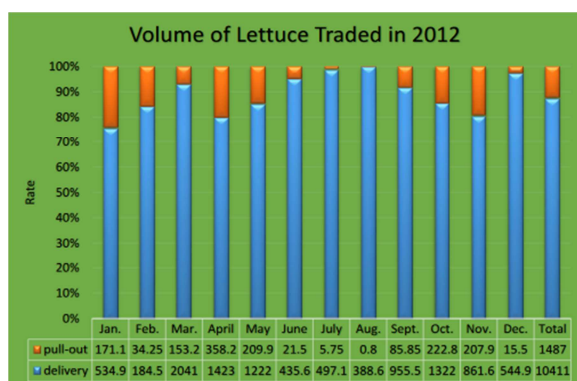


Fig. 10. Trade of lettuce in the CAR in 2012

Pull-out was at its highest (32%) in January when supply is observed to be declining. This decreased in the next two months only to increase again in April. It is noted in the graph that pull-out rate is fluctuating every two to three months. The lowest rate is recorded in August when supply was the second lowest for the year. The rate of pull-out for the year was 14 percent which is more or less the same as the average rate of pull-out for the year.

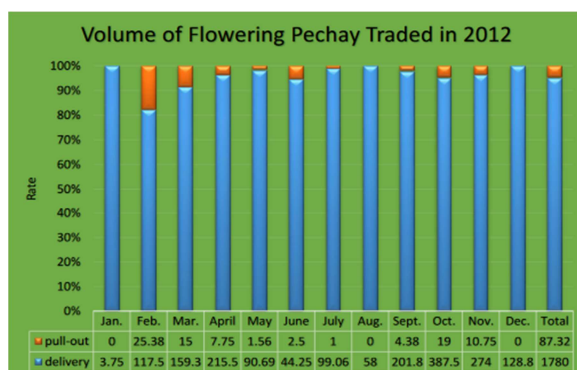


Fig. 11. Trade of flowering pechay in the CAR in 2012

Flowering pechay

Compared with the other varieties of pechay like pakchoi and chinggang, only a few of the farmers

raise the flowering pechay variety. In the graph above, it can be seen that the farmers start to produce this variety towards the end of the rainy season since supply is high in the months of September to November, declines in December until it reaches its lowest level in January. It begins to peak again from February until the summer months but falls and rises in the next four months (Fig. 11).

When supply started to peak up in February, the highest pull-out rate (22%) for the year was registered. It was in July when the lowest rate of pull-out was recorded. There were months when supply equalled demand recording no pull-outs. This occurred in January, August and December. During these months, shortage in supply might have actually occurred.

Pechay (pakchoi/chinggang)

Fig. 12 shows how pakchoi and chinggang pechay varieties were traded in 2012. Generally, the volume for this variety is not stable. Like the flowering variety, the highest volume of produce was also recorded in October reaching almost a thousand kilos. It can be noted that the supply scenario for both these pechay varieties are the same.

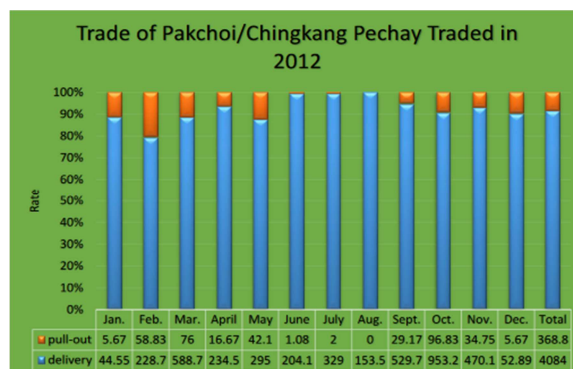


Fig. 12. Trade of pakchoi/chinggang pechay in the CAR in 2012

Production peaks during the summer months and after the end of the rainy season. Supply starts to dwindle in December and drops to its lowest in January. The highest pull-out rate was recorded in February when supply has started to increase. It was during the months of June and July that pull-out rate

was low probably because there was high demand during the period. In August, all supplies were sold. Unsold produce accounts for nine (9) percent of the year's production and the average rate of pull-out was about nine (9) percent, too.

Potato

Among all the vegetables included in the study, potato has the lowest rate of pull-out because it has the longest shelf-life. The supply for this crop is presented in the next graph (Fig. 13).

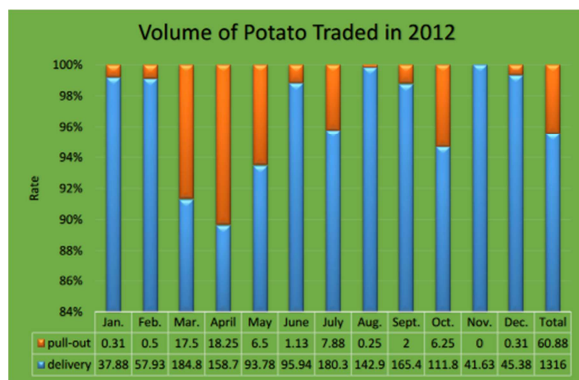


Fig. 13. Trade of potato in the CAR in 2012

From November to February, the supply of potato is lower compared with the other months of the year. Supply is generally higher from March to October peaking in March and July. Though high pull-outs were recorded from March to May, these ranged only from 7-12 percent. Lower rates of pull-out were noted in the second half of the year, showing the lowest rate in August and no pull-out in November, probably because of a more favourable climatic condition during this period. Only about five (5) percent of the potato traded in 2012 was unsold and average pull-out rate for the year is 3.5 percent.

New Zealand spinach

In the graph that follows, the trade scenario for New Zealand spinach is shown. Except for the first two months of the year where there is a low supply of this commodity, the supply of New Zealand spinach is stable during the rest of the year. Production starts to peak at the onset of the rainy season until it reaches its highest levels in September and October and

registers a downward trend from November until February. It rises again in the next two months before declining in May (Fig. 14).



Fig. 14. Trade of New Zealand spinach in the CAR in 2012

The trend for pull-out, as seen in the figure is parabolic where the lowest pull-outs are in the middle months of the year while the highest are on the first two months and last two months when supply was lower. Demand seemed to decline during these periods. Over nine (9) percent of the produce for the year was unsold. The average pull-out rate for the year under study was almost 11 percent.

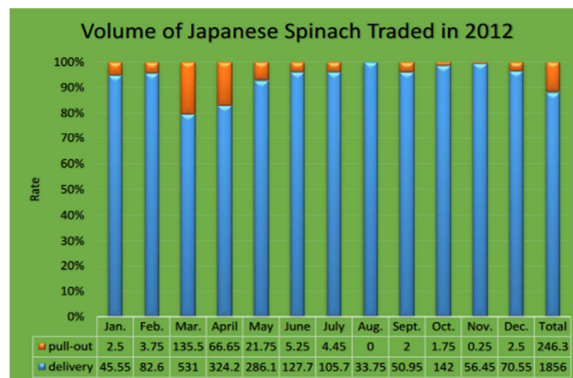


Fig. 15. Trade of Japanese spinach in the CAR in 2012

Japanese spinach

The figure below shows the supply situation for Japanese spinach in 2012. It is noted that there is a similar trend in the supply or production of leafy vegetables particularly pechay and spinach in which there are two peak periods in a year, at the onset of the cold months and the summer months.

However, production is higher during the summer months (Fig. 15).

It can be seen in the figure that supply is highest in March but declines gradually in the succeeding months until it reaches its lowest level in August gradually rising again in September but not as high as those registered during the summer months. Probably, its supply is just being sustained by farmers who have greenhouses and thus are able to continuously produce the crop.

However, the high volume of production in March resulted in oversupply since it is also during this period that the highest pull-out rate is registered. During the latter half of the year when low or no pull-out is registered, supply may not be enough to fill in the demand for Japanese spinach.

Cherry tomato

Presented in the next graph is the supply scenario for cherry tomato in 2012. The highest volume traded for this tomato variety is registered in May and declines sharply in the succeeding months until there is almost no production in September. Supply increases in the last quarter but not as much as those registered during the summer months. However, it is also towards the summer months that pull-out rates are higher. This could be a result of oversupply during the period. Supply is just enough to cope with demand after the second half of the year where no or low pull-outs were noted. About 17 percent of the total produce for the year are not sold (Fig. 16).

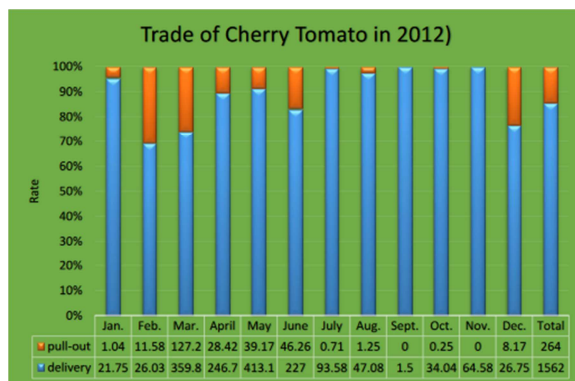


Fig. 16. Trade of cherry tomato in the CAR in 2012

Large tomato

This tomato variety is not being extensively traded in the CAR as evidenced in the figure below. If being produced at all, production is limited during the summer months, but the volume is only in tens of kilograms or even lesser. Though supply is already limited, not all supplies are sold. There is an average of 6.8 percent pull-out rate (Fig. 17).

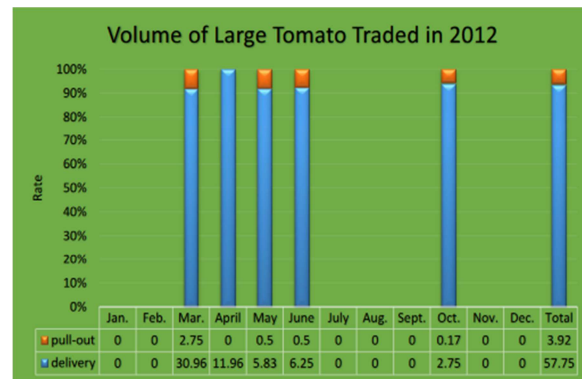


Fig. 17. Trade of large tomato in the CAR in 2012

Problems and constraints in the trade of organic vegetables

The challenges of organic vegetable production in the CAR on the part of the farmers and the Cooperative are presented in the next Fig. 18

Pull-out is the most common problem experienced by almost all organic producers. This is considered as wastage or spoilage unless it is sold at a discounted price by the Cooperative. Pull-out is the result of oversupply of the vegetable in the market. Oversupply occurs when farmers harvest and deliver to the Cooperative at the same time. Due to pull-outs, farmers have lower sales, incur losses and have lower income.

Though the Cooperative was established with the main purpose of marketing the products of its members, the marketing system is far from being efficient, ideal and responsive to the actual needs of the members. The members have pointed out the absence of a mechanism that would enable them to actually track pull-outs. The Cooperative just records pull-outs in their members' account without providing proof to members of the same.

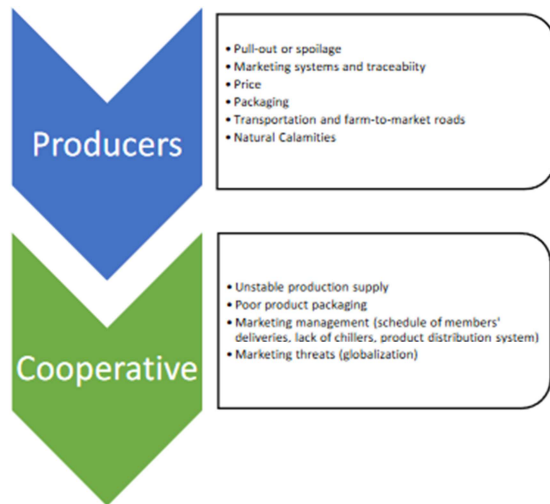


Fig. 18. Problems and constraints

The high prices of organic products also results in lower sales, low income or less profit to farmers because customers are uninterested in buying. The packaging of products is also considered a constraint. Made of poor quality materials, the products are not visually attractive to consumers. Furthermore, the packaging materials used are not consistent with the lifestyle being promoted in the consumption of organic or natural products because they are only made from non-biodegradable plastic materials and brought only from stores. Since packing is done manually, it is prone to contamination and may even hasten the deterioration of the quality of the products.

The road network and the natural terrain in the Cordillera and the absence of farm to market roads hamper the efficient marketing of organic vegetables. In the region, organic farms are located or established as far as possible from conventional farms. Access to transportation is difficult if not available in these farms. These conditions make it hard to bring products to the nearest Cooperative outlet and may cause deterioration in the quality of the products once they reach the market.

In the study of Sai (2022), constraints faced by farmers in the production and marketing of vegetables include, price fluctuations, weather fluctuations, post-harvest losses, labor shortage and lack of adequate storage facilities, among others.

Organized retailers, on the other hand are price fluctuations, post-harvest losses and lack of transportation. These were also noted in this study.

According to Llorito (2020), small farmers often experience difficulty accessing inputs and markets for their produce while buyers find it also difficult to get the quantity and quality of products they need on a timely basis. In a study on the supply chain of vegetable production, results show that while some vegetables could be grown all year round to meet market demand, other vegetables may be available only during certain months resulting in large supply during these months (Fronza, 2022).

On the part of the cooperative, the problems and challenges it faces cover from production to marketing. On the production level, the instability of supply is a foremost concern. During boom months, oversupply and high pull-out rates are registered, particularly in the first quarter of the year. Shortages are noted during lean a month which usually starts in the second quarter and throughout the rest of the year. High production supply and high pull-out rates occur when members deliver their produce to the Cooperative simultaneously.

The members pack and label their products prior to bringing them to the market. Labels are bought from the Cooperative and packaging materials are purchased anywhere. This results to poor quality packing and packaging.

In the management of the marketing function of the Cooperative, problems and challenges encountered include the need to schedule members' deliveries, the lack of chillers and improvement of the product distribution system. As earlier stated, members bring their products to the Cooperative anytime, without any schedule resulting to a large volume of products that the Cooperative need to trade, any single day which, oftentimes, the Cooperative could not cope with. The lack of chillers in retail outlets shortens the shelf life of the vegetables and results to spoilage. The process of product distribution is still far from being efficient and systematic.

Table 1. Basis for a proposed planting calendar

Vegetable	Production Period (in days)	Months when supply is low	Months when pull-out rate is low/zero
Baguio/snap beans	60-70	January	March, June, August
French beans	45-72 *	February	February, June- September
Broccoli	55-85 *	January-February	August, September
Cabbage	90	January-February	August, October
Carrots	90-120	February	September-November
Cauliflower	55-85	January-February, December	January-February, December
Cucumber (native)	40	February, September	January-February, December
Lettuce	45-60*	February	July-August
Flowering pechay	30-40	January	January, August , December
Pakchoi/chinggang pechay	40	January, December	June-August
Potato	80-100	January, November- December	August, November
New Zealand Spinach	55-65	January, February	June-August
Japanese Spinach	50	January, August	August, October- November
Tomato (small/cherry)	50-65	September	September
Tomato (large)	55-65	January-February, July-September, November-December	January-February, April, July-September, November-December

Only a single vehicle is owned and used by the cooperative to bring the products to the various outlets. Shipping products outside the CAR using only cargo buses results to the incurrance of losses. The threats of globalization and the impact of free trade are challenges that the Cooperative has to deal with.

Basis for a proposed planting calendar

To address the problem of oversupply and high rates of pull-out or spoilage and be responsive to market needs, farmers are encouraged to time their production in such a way that they are going to harvest during months when supply is low and pull-out is either zero or low indicating that production is low. Demand-supply, or the availability of produce-vegetables, was determined by the farmers’ adherence to the vegetable calendar as the greater supply of vegetables in the market was based on the planting season (Fronda, 2022). Since vegetables are highly perishable crops and organic vegetable production has limited or niche market status, there is a need to develop production plan that is market-oriented, in order to be profitable.

Below is a basis for a proposed planting calendar to serve as basis for organic vegetable production in the CAR (Table 1).

Conclusion

Almost 40MT of the vegetables under study was traded by the Cooperative in the CAR in 2012 where

leafy vegetables like lettuce, pechay and spinach were the most traded. These vegetables require shorter production period and their prices are lower, thus more affordable to consumers. Volume of trade peaks towards the start of the second quarter of the year when farmers harvest those they planted during the colder months (October to February) or when the wet season is over.

Deterioration in the quality of some vegetables, like carrots, when placed in the market, makes them unsaleable resulting to a high pull-out rate. Highest pull-out rate is registered during the month of April when volume of trade is also highest. Farmers harvest their produce simultaneously during this time.

Supply of Baguio/Snap beans, broccoli, cabbage, lettuce, pakchoi/chinggang pechay, potato, Japanese spinach, and tomato reach their highest peak in March and starts to dwindle in the succeeding months until it reaches its lowest in February. Supply of carrots, cauliflower, flowering pechay and New Zealand spinach starts to rise during the last quarter of the year.

Low or zero pull-out rates are noted during the third quarter of the year particularly in the month of August which may be indicative of low supply due to low production since it is rainy season.

Oversupply, unstable production supply and pull-out or spoilage is most common constraints that affect the

production of organic vegetables in the CAR. These lead to low sales, losses and low income.

A planting calendar is proposed to serve as basis for farmers to plan their production so that they harvest when supply and pull-out rates are low indicating that production is low. This would address the problem of oversupply and high rates of pull-out or spoilage and make production more responsive to market needs.

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