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PROJECT NOTE NO. 11

AGRICULTURAL COMMODITY MARKETING ANALYSIS

VEGETABLES AND INDUSTRIAL CROPS

LAM NAM OON INTEGRATED RURAL DEVELOPMENT PROJECT

ISSUED BY

CENTER FOR RURAL DEVELOPMENT
LOUIS BERGER INTERNATIONAL, INC. U.S.A.
UNDER CONTRACT WITH MINISTRY OF
AGRICULTURE AND CO-OPERATIVES OF THE
KINGDOM OF THAILAND

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AUGUST 1983

FOREWORD

The Louis Berger International, Inc. advisory team at Lam Nam Oon produces various kinds of informational and analytical data. These comprise: Technical Notes; Project Notes; Agro-Industrial Investment Opportunity Studies, and advisory memoranda.

The subject of this particular Project Note required two years of investigations and observation at Lam Nam Oon. The period runs September, 1981 to August, 1983. This work was organized and directed by Mr. Anthony M. Zola, an economist employed by the Louis Berger International, Inc. advisory team. He was assisted by Mr. Dusit Chanthayhuen and Mr. Dayuth Rakmanee of the advisory team in collecting the data.

During this period, Mr. Zola and his staff also trained staff of the Lam Nam Oon Operations Center to continue gathering this kind of information. They will be assisted, after September 30, 1983 by Mr. Zola's successor on the Louis Berger International, Inc. advisory team Mr. Cherdchai Ongsiriwittaya.

The materials contained in this Project Note can be of considerable reference and policy-determining value in future at Lam Nam Oon. Particularly so, because at this irrigation project the emphasis is upon only developing market-oriented crops with assured and high value potentials.

Accordingly, the Center for Rural Development, which is a Division of the Louis Berger Group of companies, issues this Report as Project Note No. 11.

Currently, in 1983 the Center supports ten major rural development projects which are funded by the World Bank, the Asian Development Bank, the U.S. Agency for International Development, and other international and national agencies in Asia, Africa, the Middle East, and Latin America.

As part of its services to clients and the professional community of those engaged in rural development, the Center releases technical and project information on various aspects of individual projects.

For those interested in Project Note No. 11 (Lam Nam Oon) additional copies may be obtained from the Center for Rural Development, c/o Louis Berger International, Inc. 100 Halsted Street, East Orange, New Jersey 07019, U.S.A.

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I. INTRODUCTION

As part of the market research and development effort at Lam Nam Oon, extensive research was conducted on the trading of vegetables and industrial crops in local markets. The purpose of this research was to identify marketing channels, seasonal price variations, and vegetable crops for which ready markets exist.

With this information, recommendations can be made regarding: the need for additional agronomic research; the identification of selected vegetable crops; for promotion/production of vegetables for sale during periods when premium prices are obtainable; and, the location of local markets which offer generally higher prices.

The results of this market research along with conclusions contained in this report should be transferred to farmer-irrigators and agricultural extension field staff at Lam Nam Oon. Through the training offered to members of water user groups at the Ban Fang Daeng Rural Development Training Center and in the training of agricultural field staff, sponsored by the Department of Agriculture, preliminary results of this research have been presented on numerous occasions. Farmer-irrigators will continue to be trained at Ban Fang Daeng, however, and field staff will be replaced. Thus, the need to continue the transfer of the information contained in this report through the training mechanism.

The research on vegetable marketing was conducted with the ultimate objective of influencing cropping patterns practiced by farmer-irrigators at Lam Nam Oon. The conclusions will point out the unique opportunities available to Lam Nam Oon farmers due to the fact they are located within an irrigated area. Employing the information presented here and the irrigation infrastructure already in place, farmers at Lam Nam Oon can generate significant returns from vegetable production.

1. Market Research Activities

In order to establish a statistical base from which conclusions could be drawn and recommendations made, it was necessary to conduct in depth research of markets serving the Lam Nam Oon area.

A survey of vegetable prices was conducted monthly in the principal markets of Sakon Nakhon province, in particular those markets which served as outlets for agricultural commodities produced by Lam Nam Oon farmers. These markets included:

Sakon Nakhon city market
Phangkhon district market
Sawangdaengin district market

In addition, periodic surveys were conducted at smaller markets where the volume of vegetables traded was significantly less than the three markets mentioned above. These small markets included:

Ban Dongmafai, Tambon Khamin, Amphoe Muang,
Sakon Nakhon

Ban Thatnaawaeng, Tambon Thatnaawaeng, Amphoe Muang,
Sakon Nakhon

Phannanikhom district market, Amphoe Phannanikom,
Sakon Nakhon

- 1.1 The price surveys were carried out by a research assistant employed by the Louis Berger International consulting team at Lam Nam Oon. Prices were generally surveyed during the middle of each month. A simple form with a list of selected vegetables was used in conducting the survey. The prices obtained were retail prices. Depending on the vegetable, wholesale prices were found to be from .25 to 3 baht less than the retail price.
- 1.2 In the course of conducting price surveys, the researcher also periodically inquired into the volumes sold of selected vegetables, the wholesale prices of certain vegetables, locations at which vegetables were purchased, and the areas where certain vegetables were produced.

2. Market-Oriented Production

With an understanding of seasonal price variations and channels through which vegetables were marketed in the Sakon Nakhon area, preliminary recommendations could be made regarding the types and varieties of vegetables preferred by local consumers. Assuming that the agronomic technology was available and the agro-ecological conditions suitable, farmers could be encouraged to grow those vegetables which bring the highest returns. Without a clear understanding of local market conditions, crop promotion efforts cannot be expected to achieve their planned objectives. Linking irrigated vegetable production to local market demands will insure that marketing risks are limited.

- 2.1 Agricultural Research: Once vegetables have been identified as being in demand in local markets, agricultural technology should be made available or developed in order to produce those vegetables. It is necessary thus to relate agriculture research at Lam Nam Oon to crops for which outlets exist.

To some extent this link between agriculture research and market demand is being developed at Lam Nam Oon. Farming systems and cropping pattern research have included several

crops which are in demand in local markets. In addition, research on mixed farming at Lam Nam Oon includes agronomic tests and agro-economic analysis on several oriented crops.

It will be necessary to continue to orient agriculture research toward crops with local, regional, national, and international outlets. The series of tests, trials, and demonstrations which are required by current research methodology must occur previous to any intensive promotion program.

- 2.2 Agricultural research on vegetables at Lam Nam Oon should be conducted at locations where soils have been identified as being suitable for vegetable production. Soils maps at the Lam Nam Oon Operations Center identify such locations and should be studied carefully by Department of Agriculture researchers as well as agricultural extension field staff. It is anticipated that soils maps at the 1:4,000 scale will be completed for several Units at Lam Nam Oon. Ultimately, all 23 Units will have such maps. These maps will identify chak areas (area served by one water delivery ditch) which are best suited for cultivating vegetables. It is on these soils and at these locations that vegetable research and promotion activities should occur.

2.3 Production of vegetables for processing:

There exist in the upper Northeast five vegetable processing facilities, all of which report a seasonal shortage of raw materials for processing. These facilities, their locations, and present raw material requirements are listed on Table 1. The facilities have the capacity to process from 5 to 100 tons of raw material daily.

The Lam Nam Oon Operations Center has been in contact with the five facilities during the past two years. The management of each facility has offered a production quota to Lam Nam Oon, based upon an informal agreement or a written contract. Crops with the highest demand include tomatoes, young ear corn, and pineapple. There is also a local demand for Japanese. Separate investment opportunity studies have been prepared by the Louis Berger International consulting team on Japanese suyo melon, tomatoes, and young ear corn.

To date, agricultural research on industrial crops has been conducted only on young ear corn at Lam Nam Oon. The Soils and Fertilizer Division of the Field Crops Institute of the Department of Agriculture conducted fertilizer trials and water application tests on this crop at four locations at Lam Nam Oon during the 1982-1983 dry season. Further research will need to be conducted before technical recommendations can be made regarding the production and expansion of young ear corn at Lam Nam Oon.

Vegetable Processing Facilities

Upper Northeastern Thailand

Table 1

Name of Facility	Location	Raw material requirements
1. Khon Kaen Lablae Canned Foods Co., Ltd.	Amphoe Muang Khon Kaen	tomatoes, pineapple, young ear corn, rambutan
2. Srichiangmai Agriculture Industry	Amphoe Srichiangmai Nongkhai	tomatoes
3. Lakchai Trading Co., Ltd.	Amphoe Srichiangmai Nongkhai	tomatoes
4. Royal Canned Foods Project	Amphoe Taongoi Sakon Nakhon	tomatoes, young ear corn
5. Thai Nirot Agriculture Industry	Amphoe Kudbak Sakon Nakhon	Japanese suyo melon

No formal agricultural research has been conducted on tomatoes, pineapple, or Japanese suyo melon at Lam Nam Oon to date. This research should be conducted before any crop extension program can be undertaken by project staff.

The production of vegetable crops for processing also requires the development of techniques for managed crop production. Any proposed management system should be prepared to consider:

- location of production areas
- selection and training of producers
- credit and agricultural input arrangements
- extension and follow up services
- land preparation
- planting and harvesting schedules
- transport and marketing arrangements
- method of payment for produce sold

The Lam Nam Oon Operations Center conducted a pilot program in the managed production of young ear corn during the 1982/83 dry season. A separate report has been prepared evaluating this program. That evaluation should serve as a basis for future attempts at the managed production of industrial vegetable crops.

The agro-industrial investment opportunity report on tomato production at Lam Nam Oon should be referred to when considering the implementation of a managed production program. The tomato report recommends an integrated management approach, including the participation of private sector representatives.

II. LOCATION OF MARKETS IN THE LAM NAM OON IRRIGATED AREA

1.1 Markets which serve as outlets for commodities produced by farmer-irrigators at Lam Nam Oon, in approximate order of volume of vegetables traded, include:

- Sakon Nakhon city markets
- Phangkhon district markets
- Ban Thatnaawaeng markets
- Ban Dongmafai markets
- Phannanikhom district markets

- 1.1.1 Being in the provincial capital, the Sakon Nakhon city markets would tend to have the largest volume of turnover in produce during any one period. The city markets serve primarily areas to the east and south of the city. Other markets tend to dominate trade with population centers west and north of the city.
- 1.1.2 The Phangkhon district market located sixty kilometers west of Sakon Nakhon, continues to grow as agro-industries move into the area. Market vendors from several neighboring districts purchase large quantities of vegetables at the Phangkhon market for resale. These neighboring markets include fresh market outlets in the district towns of Waritchaphum, Wanoniwat, Ban MOUNG, Phannanikhom, Akat Amnuay, Khamtakhaa, and Nikhom Nam Oon.
- 1.1.3 Ban Thatnaawaeng: There exist two markets in this thriving village, located at the junction of highways 22 and 213, where highway 22 turns off to Nakhon Phanom, five kilometers west of Sakon Nakhon. The two markets are less than one year old at this writing, and were established by rival entrepreneurs following a fire which destroyed the old market in December 1982.

Located in this village are the Sakon Nakhon Teachers' Training College, Sakon Nakhon Technical College, and a military installation of the Second Royal Thai Army.

The geographic location of this village gives its markets an advantage over other markets in the area. The provincial city of Sakon Nakhon is bounded on the north by the Nong Han lake. Access to the Sakon Nakhon market for traders and consumers from areas north and west of the city is thus through Ban Thatnaawaeng. Traders from the market towns of Ban Tharae and Kusuman can save time, cost of transport, and avoid inconvenience by trading in the Ban Thatnaawaeng markets.

1.1.4 The village market at Ban Dongmafai, located 20 kilometers west of Sakon Nakhon, serves the numerous villages in Tambon Khamin, Amphoe Muang, and in Tambon Naahuaboh and Tambon Pawknoi, Amphoe Phannanikhom. An active ethnic Vietnamese community living in the village is the most likely reason for the market activity. Although the fresh market is small and most trading limited to the early morning, a high volume of wholesale trading occurs in this market. Traders of field crops and vegetables are very active and highly mobile. Many traders in this village serve as local middlemen, buying at the farmgate and selling to larger middlemen or processors.

Vegetable traders are especially active, buying dry season vegetables from farmers in the field in small quantities; collecting the produce at Ban Dongmafai; and, shipping to the Ban Thatnaawaeng and Sakon Nakhon markets.

1.1.5 The Phannanikhom district market is located approximately forty kilometers west of Sakon Nakhon and fifteen kilometers east of Phangkhon. The fresh market is small and trading is limited to the early morning hours. A small evening market with a total of ten to twelve vendors also exists in this district town. Market activities are dominated by the predominant ethnic Phu Thai group, and limited to produce purchased from middlemen in the Phangkhon and Dongmafai markets.

III. OBSERVATIONS ON VEGETABLE TRADING

Vegetables traded in the five markets serving the Lam Nam Oon area are obtained from three principal sources: areas of intensive vegetable production near Phangkhon and in Sakon Nakhon, and through middlemen who transport vegetables into the Lam Nam Oon area from other provinces.

1. Vegetables are produced throughout the year by farmers living in Ban Naamuangnoi, a village approximately three kilometers south of Phangkhon, on the road to Amphoe Waritchaphum. Several farmers from this village own plots of land which receive water from irrigation canal L-1L-1L. In addition, farmers who do not benefit directly from the irrigation system in this area cultivate vegetables using water which seeps into the borrow pits along the canal.

1.1 The area under cultivation in vegetables the year-round is approximately 85 rai. The soils in this area are suitable for continuous cultivation, being of the Korat soil series and well drained. The soils map in the Lam Nam Oon Situation Room which identifies soils appropriate for dry season vegetable cultivation indicates that soils in this area will bring the highest yields of vegetables.

- 1.2 Vegetables produced in this area include kale, shallots, and lettuce on a year-round basis. Other leafy vegetables are produced during the cool and dry seasons. An estimated 85 farmers are involved in year-round cultivation, while 10 more cultivate during peak production seasons.
- 1.3 The principal outlet for vegetables grown at Ban Naamuangnoi is the Phangkhon district market. Vegetable vendors from the Phangkhon market will generally buy from producers at the farmgate or in the field, although some producers transport their vegetables to market themselves.

Thus, a primary source of vegetables traded in the Phangkhon market is the produce from Ban Naamuangnoi. This marketing channel is firmly in place, resulting in vegetable traders in the Phangkhon market performing a middleman function. The development of this middleman function has probably contributed to the growth of the Phangkhon market. Because of its location in relationship to other district towns as well as vegetable production areas, Phangkhon has the potential to develop into a small "central market".

2. Within the city limits of Sakon Nakhon, near the fresh market, there is a low-lying area which produces vegetables the year-round. The area is known as Nuanmanee, and is a densely populated area of ethnic Vietnamese. Humus and other municipal wastes have been used to build up small, highly productive, intensely cultivated plots where the Vietnamese produce vegetables. Production during the wet season frequently decreases as portions of the area are inundated.
 - 2.1 In this case, the families who produce vegetables often are vegetable vendors in the Sakon Nakhon market. Because of the limited space, vegetables produced are either consumed in the quarter or sold in the local market, and not shipped out of the city.
 - 2.2 Vegetables produced here include lettuce, Chinese morning glory, kale, coriander, cabbage, and celery.
3. Although some of the vegetables produced at Ban Naamuangnoi can be expected to be sold in other Lam Nam Oon markets, these outlets generally obtain vegetables from middlemen who transport produce from other provinces. Large quantities of vegetables are shipped into the Sakon Nakhon area beginning in mid-March. Vegetables are transported from Udorn, Khon Kaen, Nakhon Rachasima (Korat), and Bangkok. Chilli peppers are brought into the area from Ubon, Nakhon Phanom, Roi-et, and Nongkhai.

- 3.1 Middlemen who transport vegetables into the Sakon Nakhon markets purchase large quantities wholesale in central markets in the Northeast and from Bangkok. Trucks with a capacity of four to six tons owned by middlemen who trade on a regional basis will transport the vegetables from central markets to Sakon Nakhon, several times per week. Some of these middlemen will serve only one market. Others will have vendors in several markets along the route who will purchase fixed quantities on a regular basis.
- 3.2 It is difficult to determine the volume of vegetables transported into the Lam Nam Oon area. The number of shipments per week varies depending upon the season of the year and local production.
4. It is certain, though, that vegetable cultivation patterns in the Sakon Nakhon area are not different from those found in other rainfed areas of the Northeast. The peak production period is during the cool season, December through February. It is during this time that paddy farmers use residual soil moisture, shallow hand-dug wells, and small water storage tanks to produce vegetables. Quantities not consumed by the household or traded in the village will be shipped to central markets. During this time only specialty vegetables are shipped into local markets from Bangkok and other central markets in the Northeast.
 - 4.1 Beginning in mid-March, however, local vegetable production decreases, prices begin to climb, and the volume of vegetables transported into the area begins to increase. Thus, vegetables are brought into the Lam Nam Oon markets from mid-March until October on November.
5. The three markets in the Lam Nam Oon area in which wholesale and retail vegetable trading is most intensive include the markets in Sakon Nakhon city, Ban Thatnaawaeng, and Phangkhon.
 - 5.1 A total of seventeen vegetable vendors were counted selling vegetables on a more or less regular basis in the Sakon Nakhon market. Temporary vendors and farmers selling their own produce were not counted.

These vendors reported buying vegetables from local producers as well as from middlemen who transported vegetables to Sakon Nakhon from other provinces. Although the vendors preferred to purchase locally produced vegetables, supplies were inconsistent and quality was lower than that sold by middlemen.

Several of these vendors were periodically surveyed to determine the quantity of vegetables they sold daily. Depending on the vegetable, the quantities sold varied from 5 to 40 kilograms daily. The estimated total volume

of sixteen vegetables traded in one day in the Sakon Nakhon fresh market is approximately 5.8 tons.

- 5.2 Vegetable vendors from Ban Tharae, Kusuman district, and several villages west of Sakon Nakhon tend to purchase their vegetables in the Ban Thatnaawaeng markets. Three pick-up trucks of vegetable vendors from Ban Tharae, a large on the north shore of Nong Han Lake, arrive very early each morning at the Ban Thatnaawaeng markets to purchase vegetables for re-sale in their large village market. During the dry season, vegetable vendors from as far away as Nakhon Phanom (96 kilometers) will purchase vegetables in this market.

A total of thirteen permanent vegetable vendors were counted in the Ban Thatnaawaeng markets. No estimate has been made of the daily volume of vegetables traded. Farmers and vendors alike have reported however, that almost all vegetables brought into the market each morning are easily sold.

The vegetables sold in this market are obtained from the Ban Phan and Ban Huaysai areas during the cool and dry seasons. During the wet season, however, vegetables are sold by middlemen who transport vegetables from other provinces. Or, vegetables are purchased by middlemen-vendors in the Sakon Nakhon market for re-sale at the Ban Thatnaawaeng markets.

- 5.3 A total of seven permanent vegetable traders were counted in the Phangkhon district market during March 1983. Daily sales of vegetables ranged from a high 20 to 50 kilograms of fresh chili peppers to a low 4 to 8 kilograms of marrow. The total volume of sixteen vegetables sold daily is estimated to be approximately 1.7 tons. As pointed out above, vegetables are supplied to the Phangkhon market from Ban Naamuangnoi, and from middlemen who transport vegetables from other provinces.

IV. ANALYSIS OF VEGETABLE PRICE VARIATIONS

1. Methodology

Vegetable price surveys were conducted once each month in the two largest markets serving the Lam Nam Oon area: the Phangkhon district market and the Sakon Nakhon municipal market. In order to provide a comparison with markets serving the irrigated area, a monthly price survey was also conducted in the Sawangdaendin district market, which serves the rainfed agricultural area between Amphoe Phangkhon, Sakon Nakhon, and Amphoe Nonghan, Udorn.

- 1.1 In most cases, price surveys were conducted on the same day in all three markets. At no time were surveys conducted in two different markets more than five days apart.
- 1.2 Twenty-five vegetables were identified as those produced by farmer-irrigators at Lam Nam Oon, or having the potential of being produced. A list of these twenty-five vegetables appears on Table 1.
- 1.3 The vegetable price surveys were conducted monthly from October 1981 to July 1983. The data from this twenty-two month period provides the basis for this analysis. Experience in conducting market research for four years in Surin and Buriram provinces serves to complement this analysis.
- 1.4 Sixteen of the twenty-five vegetables surveyed have been identified as having the highest production and marketing potential at Lam Nam Oon. The prices surveyed for these sixteen vegetables serve as the basis for this analysis and are marked with an asterisk on Table 1.

TABLE 1

List of Vegetables Surveyed
October 1981 through July 1983

1. Fresh chili peppers*	9. Coriander*	17. Eggplant*
2. Dried Chili peppers*	10. Kale*	18. White radish
3. Lettuce*	11. Young ear corn	19. Spanish onion
4. Chinese cabbage*	12. Sweet corn	20. Unripe papaya
5. Green mustard*	13. Dwarf cucumber*	21. Marrow*
6. Cabbage*	14. Cucumber	22. Pumpkin*
7. Cauliflower*	15. Yard long bean*	23. Lime
8. Shallots*	16. Tomato*	24. Dried red onion
		25. Dried garlic

* Sixteen vegetables used in price analysis.

2. As pointed out above, Northeastern Thai farmers generally cultivate vegetables for family consumption in the cool season, just following the rice harvest. Any supplementary produce will be sold in local markets. Throughout the Northeast, prices of vegetables thus tend to be lower during the months that this supplementary produce is being marketed. This is during the months of December, January, and February. Generally, the prices of vegetables in Northeastern Thai markets will begin to increase in mid-March, climbing to a

high in June and July, and begin to decline again in October.

2.1 In the two principal markets serving the Lam Nam Oon area, vegetable prices generally followed this same pattern.

3. Vegetable prices in the Sakon Nakhon municipal market were highest in the months of March, June, July, September, and October. Lowest prices were recorded during the months of December, January, and February.

3.1 During the month of October 1981, seven of the sixteen vegetables analysed attained their highest prices, and eight their second highest prices. Again in October 1982, five vegetables attained their highest prices and three their second highest prices. In September 1982, seven vegetables obtained their highest prices, and in March 1982, four vegetables obtained their highest prices.

3.2 The lowest prices of vegetables in the Sakon Nakhon market were recorded in the months of December, January, and February of 1981 and 1982, and in February of 1983.

3.3 An examination of the vegetable price graphs for the Sakon Nakhon market reveals that the prices of vegetables July 1983 have been significantly higher than vegetable prices in 1982. This may be an indication that the supply of vegetables shipped into the Sakon Nakhon market has been decreasing, causing prices to rise.

4. The prices of vegetables in the Phangkhon district market tend to begin rising somewhat later than prices in Sakon Nakhon. That is, while prices in the Sakon Nakhon municipal market began increasing in March, those in Phangkhon remained low through March. During 1982, prices did not begin to increase until May.

4.1 The highest prices for vegetables in the Phangkhon market were recorded in October 1981 and October 1982. In 1983, most vegetables obtained their highest prices in April and June, with twelve vegetables recording their highest or second highest price in each month.

4.2 The lowest prices for vegetables sold in the Phangkhon market were recorded in the months of November, December, January, and February. This period of lower vegetable prices is one month longer than the three month period of low prices in the Sakon Nakhon market. Eight vegetables recorded their lowest prices in January 1982 and January 1983.

- 4.3 The longer period of lower vegetable prices in the Phangkhon market may be a result of the fact that a significant quantity of vegetables is produced in Ban Naamuangnoi on a year-round basis. This produce marketed in Phangkhon may tend to delay the increase in vegetable prices in this market.
 - 4.4 As was observed in the Sakon Nakhon market, vegetable prices in the Phangkhon market tended to be higher during 1983 than in 1982. Although inflation may contribute to the overall higher prices, the significantly higher prices in both markets may indicate that the demand for vegetables purchased through these markets is increasing.
5. Vegetable prices in the Sawangdaendin market tended to follow the traditional price patterns found in other Northeastern markets in rainfed areas. Vegetable prices began to increase in March, and remained high through October. Lowest prices were during the four month period beginning in November, and lasting through February.
 - 5.1 Vegetables obtained their highest prices during the months of October 1981, October 1982, and July 1983.
 - 5.2 Lowest prices for vegetables were recorded in November 1981 and February 1983, when nine vegetables obtained their lowest prices in each month.

V. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

- 1.1 Marketing research on industrial crops and contact with regional food processors has revealed that ready markets exist for such crops as tomatoes and young ear corn. A managed production pilot program on young ear corn conducted at Lam Nam Oon during the 1982/83 dry season demonstrated the potential for development of such programs.
- 1.2 It is necessary for both the agriculture research and extension components to adopt programs which are market oriented. Such an approach is necessary to insure that ready markets exist for promoted crops. Facility in marketing will serve as an incentive for Lam Nam Oon farmer-irrigators to expand dry season production. More efficient water management and more appropriate production technologies will of necessity follow.
- 1.3 Market research indicates that the five markets serving the Lam Nam Oon area experience vegetable pricing patterns which are similar to other Northeastern rainfed agriculture markets.

The existence of the irrigation system has had minimal if any effect on the inclusion of vegetable cultivation in cropping patterns. Yet, the potential exists to increase vegetable production. Three local markets are in locations which provide for an expansion of vegetable marketing opportunities. The Sakon Nakhon city markets, the Phangkhon district market, and the Ban Thatnaawaeng markets are outlets which can develop into small central markets, providing a consistent supply of vegetables are available the year-round.

- 1.4 Analysis of the prices of sixteen vegetables in the Sakon Nakhon, Phangkhon, and Wawangdaendin markets revealed that over a 23 month period, vegetable prices were highest during the month of October. As elsewhere in the Northeast, vegetable prices begin to increase in March, leveling off in April and May, before climbing again through the wet season, from June through October.

It is during the period of mid-March through the end of May that Lam Nam Oon farmer-irrigators have a comparative advantage over other Northeastern farmers. Their proximity to the Lam Nam Oon markets and the availability of water provides them with an opportunity to cultivate vegetables under irrigated conditions for marketing through local outlets. Farmers with upland holdings can cultivate vegetables through the wet season, permitting them to take advantage of the high vegetable prices during that period.

- 1.5 The sixteen vegetables analysed in this report are those with the greatest marketing potential through local outlets. These vegetables have been observed as having to be brought into the Lam Nam Oon markets from other provinces. Yet, agro-ecological conditions exist in the Lam Nam Oon area to produce all of these vegetables, under irrigated conditions, beginning in February, and under rainfed conditions or upland areas through the wet season.

Among these sixteen high potential vegetables, three have outstanding characteristics which make them worthy of special attention. They include:

- a) Chilli peppers: An agro-industrial investment opportunity study (in the Thai Language) is available at Lam Nam Oon which provides detailed information on the marketing of chillies in Thailand, and the production potential at Lam Nam Oon. The cultivation of this crop is highly recommended to farmers at Lam Nam Oon throughout the year because of high local and national demand. In addition, producers are not required to sell their peppers upon harvesting, as several varieties can be dried and stored until such time as the price of dried peppers is acceptable to the producer.

- b) Eggplants: The Department of Agriculture has conducted research on eggplants at Lam Nam Oon and found the Khon Kaen variety appropriate to soil and water conditions in the project area. Producers have obtained up to 4,000 baht net profit per rai over a three month period (March through May) from this crop. Once again the producer has the choice to not sell this vegetable should the market price be too low. Eggplant can be stored for several days without harming the quality of the product.
- c) Coriander: Although this vegetable crop cannot be conveniently stored or processed (dried) at the farm level, the high market price during the dry and wet seasons makes this crop especially profitable. A small (ten square meter) area can generate significant supplementary family income. This vegetable is quite easily grown, requiring no special maintenance.

2. RECOMMENDATIONS

- 2.1 Applied agriculture research should be integrated with the managed production of selected industrial crops at Lam Nam Oon. As ready markets already exist for tomatoes and young ear corn, agriculture research should concentrate on these two crops. In addition, a system of managed production should be developed which is suitable to the integrated administration system in place at Lam Nam Oon. Proper management, however, is dependent upon solid guidelines from research staff.
- 2.2 In addition to research on industrial crops, farm level research should be conducted on the sixteen vegetables selected for analysis in this report. This research should be linked to the cropping pattern and farming systems research already underway at Lam Nam Oon. Research should also take into consideration the suitability of the soils at Lam Nam Oon, as shown on project-wide and chak level soils maps. Such soil suitability maps are available through the Lam Nam Oon Operations Center.
- 2.3 The managed production and marketing of vegetables through water users groups was tested at Lam Nam Oon during the 1982/83 dry season. Production problems were serious, while few marketing constraints were encountered. This exercise should be repeated during successive dry seasons, with the tambon agricultural extension agents as well as the Specific Assignment Team implementing the program. Eventually, this program should be expanded to the production of vegetables during the wet season. It is crucial to the operations of water user groups to have profit-oriented activities. At the same time, it is necessary to demonstrate to farmers the advantages to group production and marketing.

Models exist for the group production and marketing of vegetables and industrial crops. These models were tested by the consultants at Lam Nam Oon during the 1982/83 dry season. The results of these tests have been documented and should be reviewed by the Lam Nam Oon Working Group before any such program is implemented in the future.

- 2.4 Needless to say, the market research and development work as related to vegetable and industrial crops should continue at Lam Nam Oon. The recommended program should consider the following priorities:
- a) Determine the volume of vegetables traded in the five principal markets serving the Lam Nam Oon area. This is necessary so that over-production does not occur.
 - b) Identify middlemen in Udorn and/or Nongkhai who export fresh and/or processed (dried) vegetables (especially chilli peppers) to the Lao markets. Production on contract for these middlemen should be considered.
 - c) Prepare an agro-investment opportunity study on a food processing facility to be located in the Lam Nam Oon area. Emphasis should be on a privately owned facility, as opposed to a public facility such as the Taongoi factory.
 - d) Related to each of the above (a, b, c), a detailed study of the transportation infrastructure should be completed as soon as possible. This is necessary in order to avoid serious problems in shipping produce to market outlets. The Lam Nam Oon Operations Center should maintain contact with local transporters, in that they are as essential as the outlet is to a marketing system.
 - e) Refine the system of managed production and marketing of vegetables through sub-groups of the water users groups. This will require repeated testing during both the dry and wet seasons.
 - f) Conduct an intensive program to promote both eggplant and chilli peppers the year-round at Lam Nam Oon. Local buyers and processors of chilli peppers need to be identified and linked to regional, national, and international outlets.
- 2.5 Agricultural field staff should become familiar with vegetable production technologies practiced in Central Thailand, which permits the year-round production of vegetables. Special officer and farmer training programs will be required to transfer this technology and adapt it to the agro-ecological conditions of the Lam Nam Oon irrigated area.

VI. VEGETABLE PRICE GRAPHS

2524 = 1981 = - x - x -

2525 = 1982 =

2526 = 1983 = o o

1. Sakon Nakhon municipal market
2. Phangkhon district market
3. Sawangdaendin district market

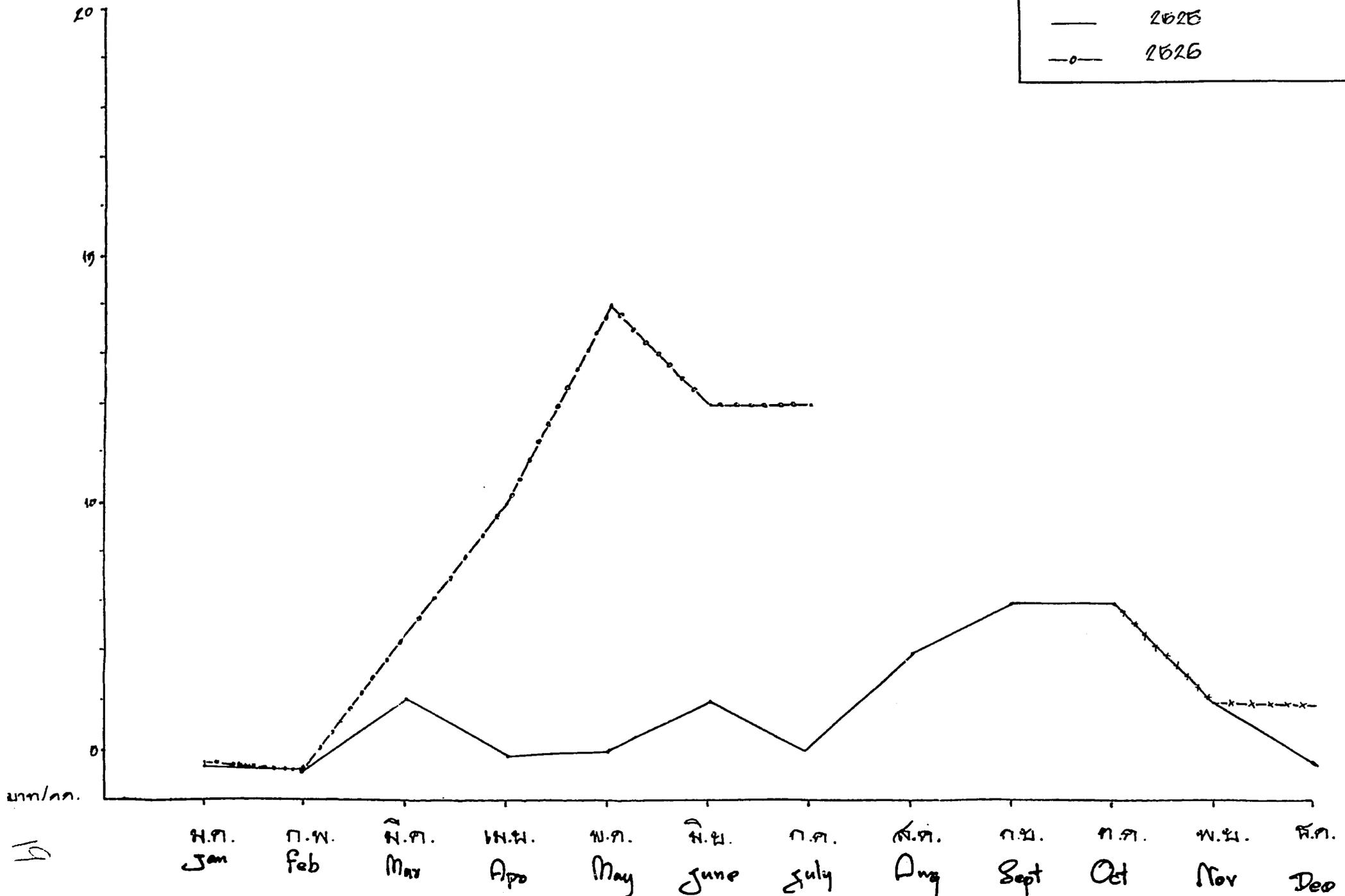
1. Sakon Nakhon Municipal Market
Amphoe Muang, Sakon Nakhon

2524 = 1981 = -- x -- x --

2525 = 1982 =

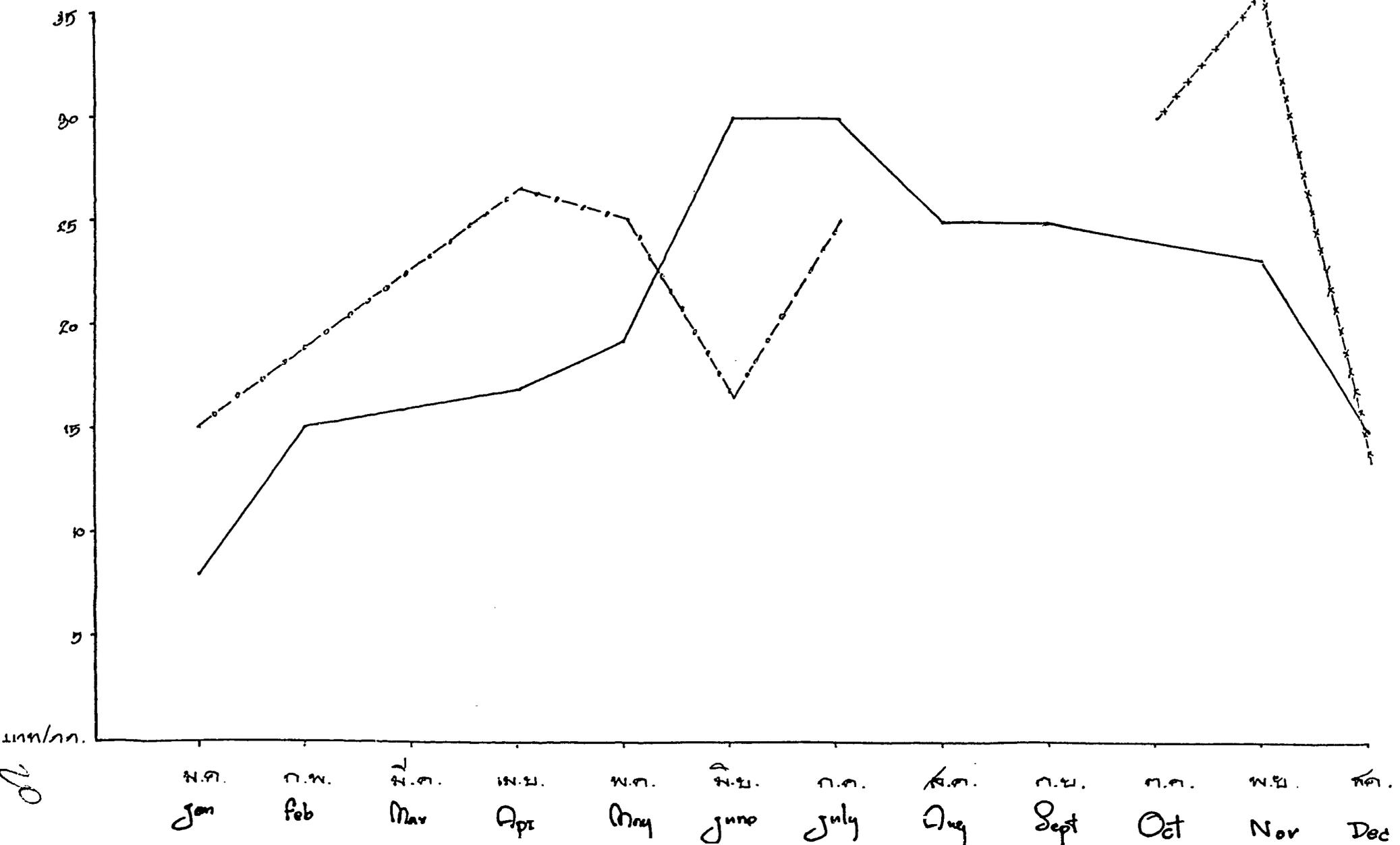
2526 = 1983 = -- o -- o --

พืชปลูก กระหล่ำปลี Cabbage
 ฤดูกาล จำลองปีปลูกทดลอง
 MARKET 2521 Sakon Nakhon
 —x— 2521
 — 2525
 —o— 2526

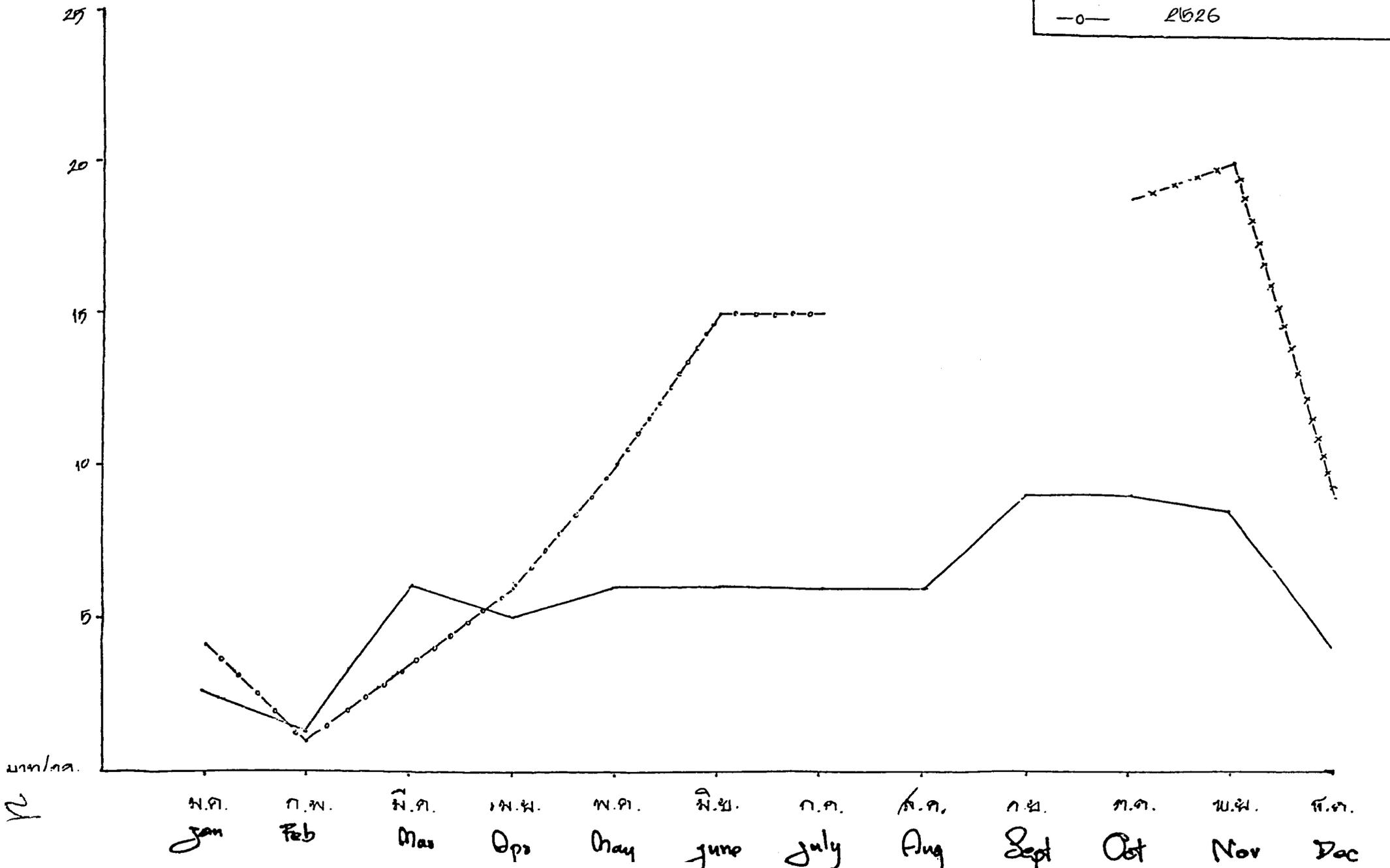


19

ไม้ดอก กะหล่ำปลี Cauliflower
 ตลาด ชิมช่อ ไม้ดอกตลาด
 Market 2524 Sakon Nakhon
 — 2025
 —o— 2026



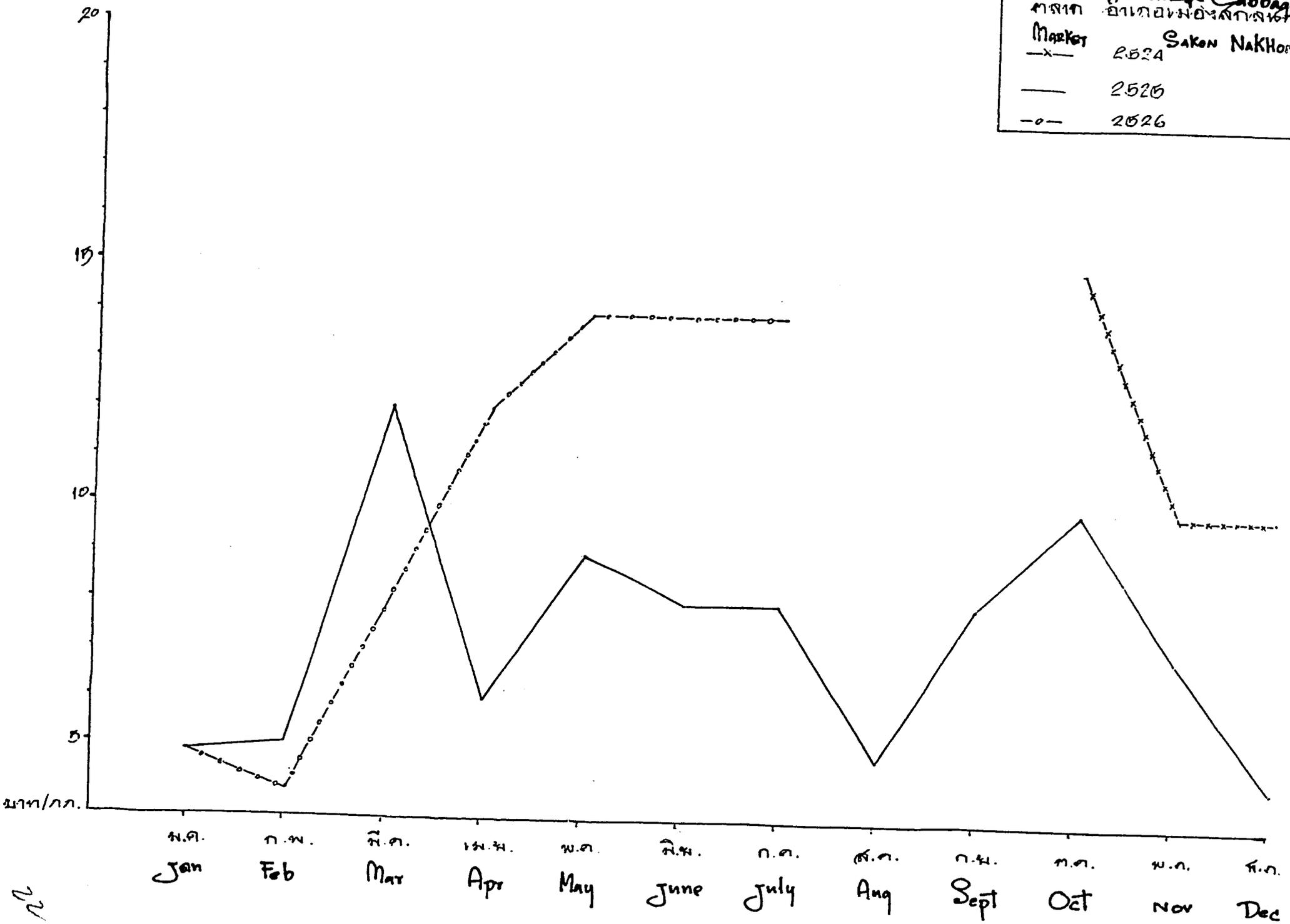
ไม้ Coop พักภาคเหนือ Lattice
 ตลาด อำเภอเมืองสุโขทัย
 MARKET 2524 Sakon Nakhon
 — 2525
 -o- 2526



บาท/กก.

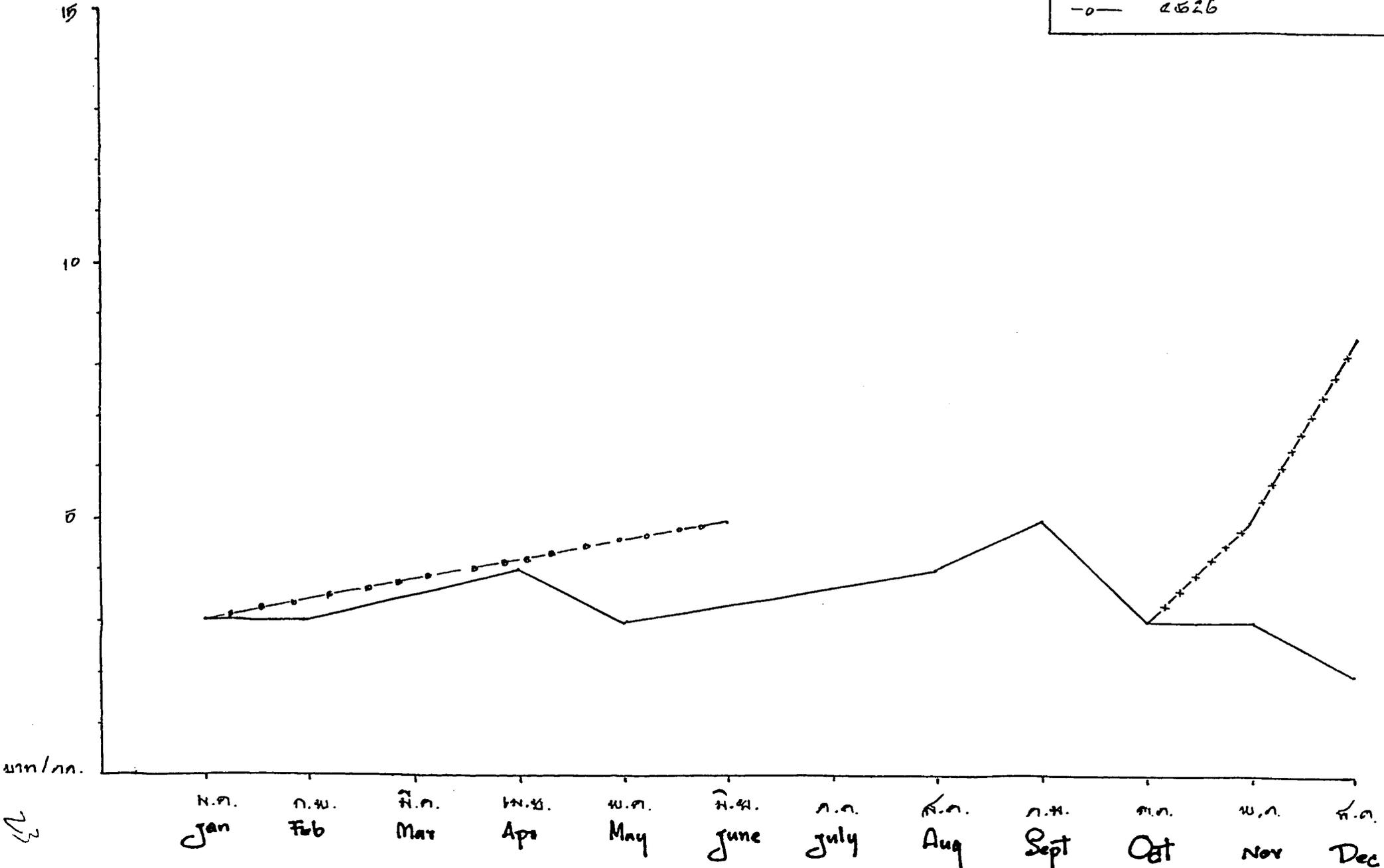
๒

๒๕๒๓
 ๒๕๒๔
 Market Sakon Nakhon
 ๒๕๒๔
 ๒๕๒๕
 ๒๕๒๖



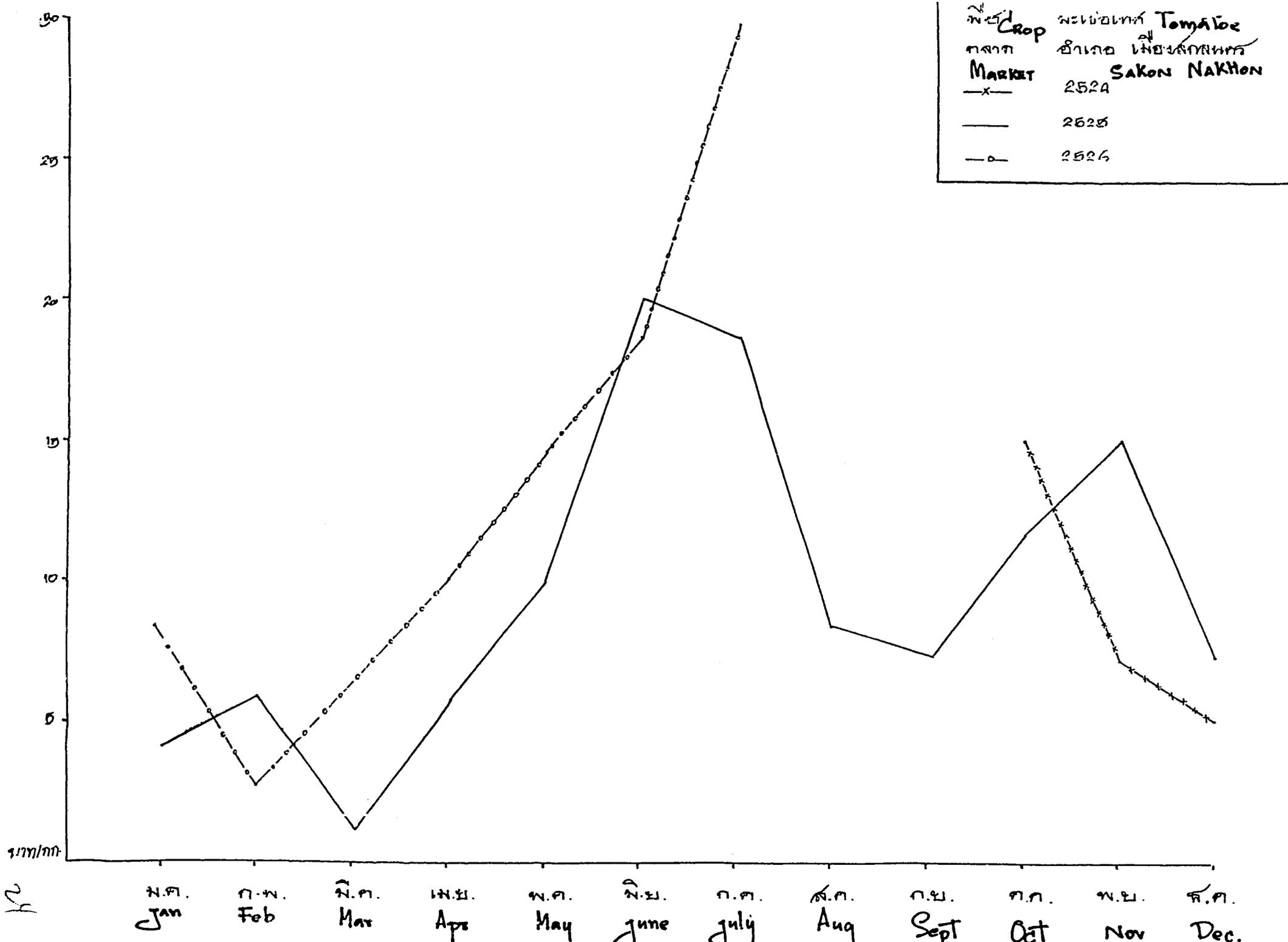
๒๕

พืช **Crop** พักภาคเหนือปัส **Green Mustard**
 ตลาด อำเภอเมืองสกลนคร
MARKET 2524 Sakon Nakhon
 -x- 2525
 -o- 2526



บาท/ก.

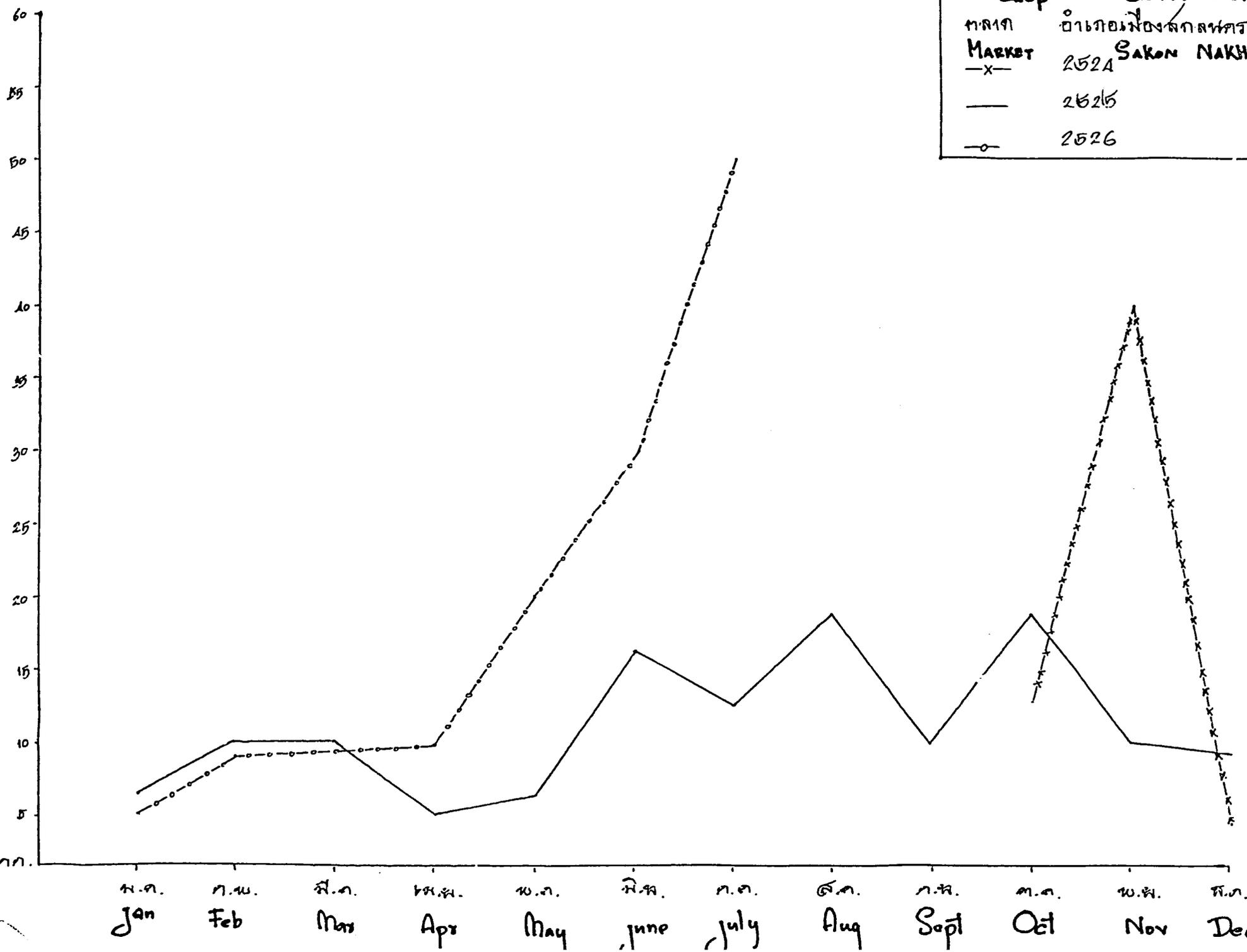
๒



พืชปลูก Tomatoes
 ตลาด เชียงใหม่
 MARKET SAKON NAKHON
 —x— 2524
 — 2525
 —o— 2526

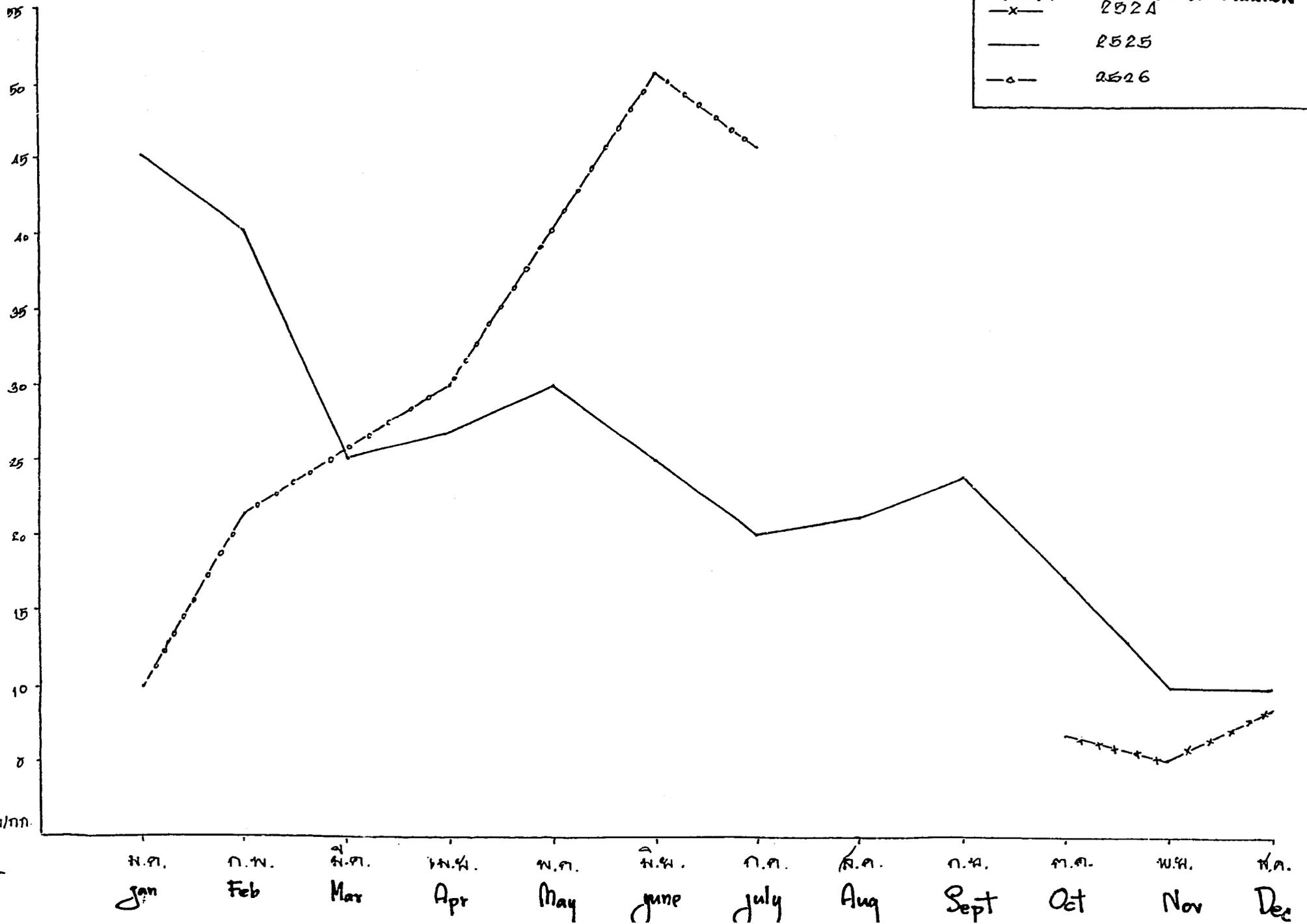
24

ผลิต Coop ผลิต Corriander
 ตลาด อําเภอเมืองสกลนคร
 MARKET 2524 SAKON NAKHON
 —x— 2525
 —o— 2526

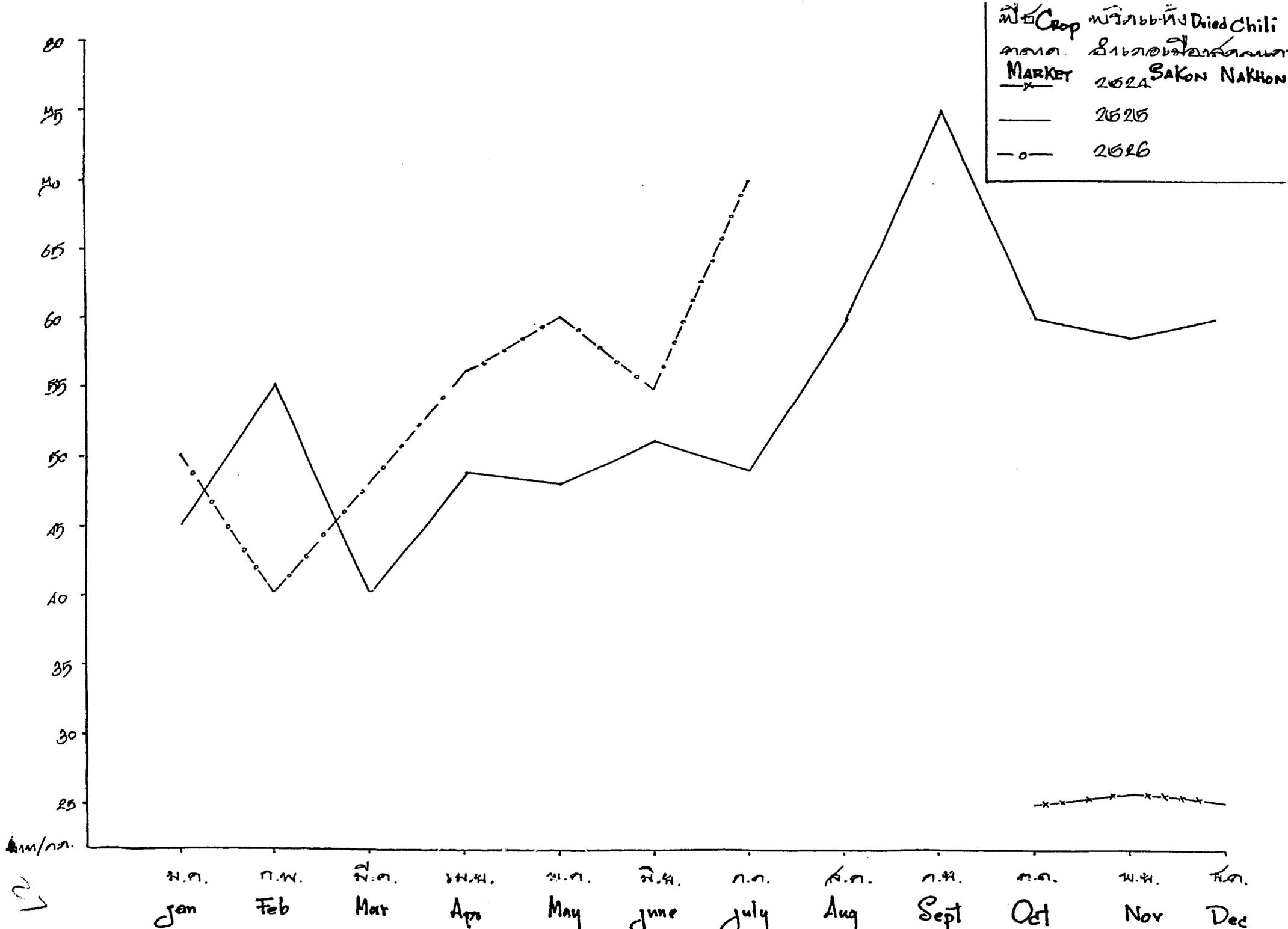


บาท/กก.

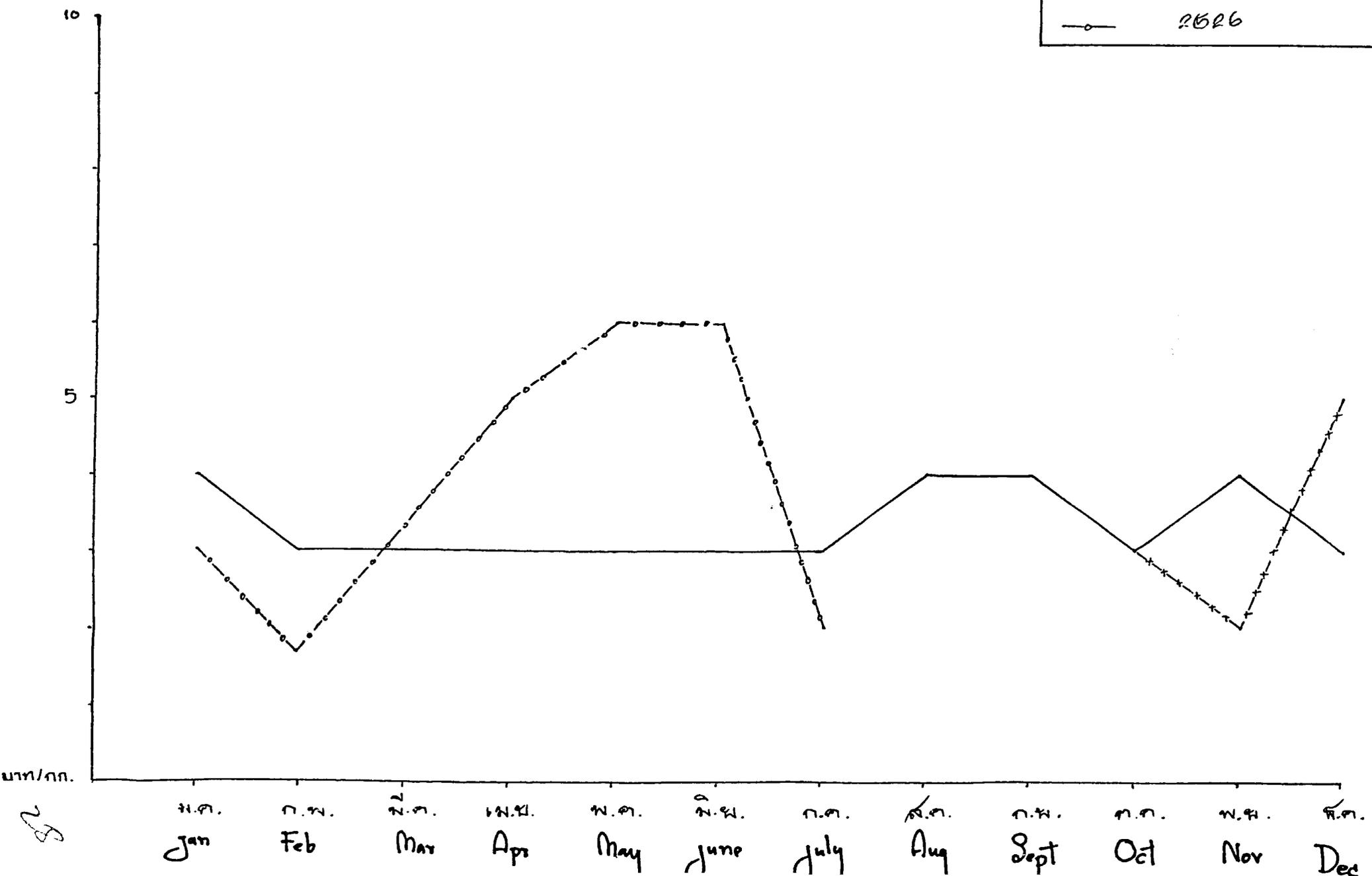
พืชปลูก	พริกสด Chili
ตลาด	อำเภอเมืองสุรินทร์
MARKET	SAKON NAKHON
—x—	2524
—	2525
—o—	2526



บาท/กก.
๗๒

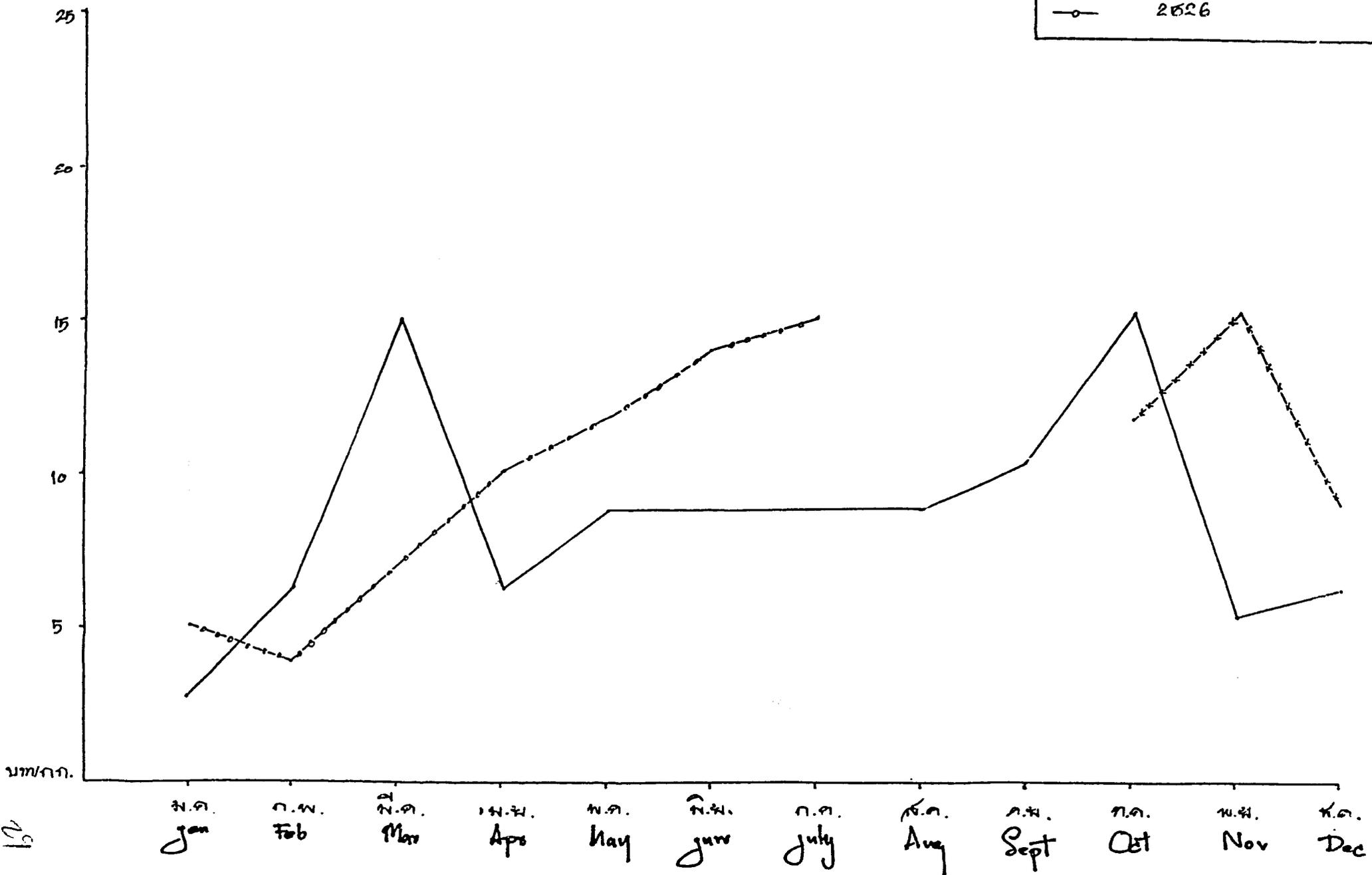


ชนิด Crop	แตงกวา Durg cucumber
ตลาด	ตลาดในขอนแก่น
MARKET	252A Sakon Nakhon
—x—	252B
—o—	2526



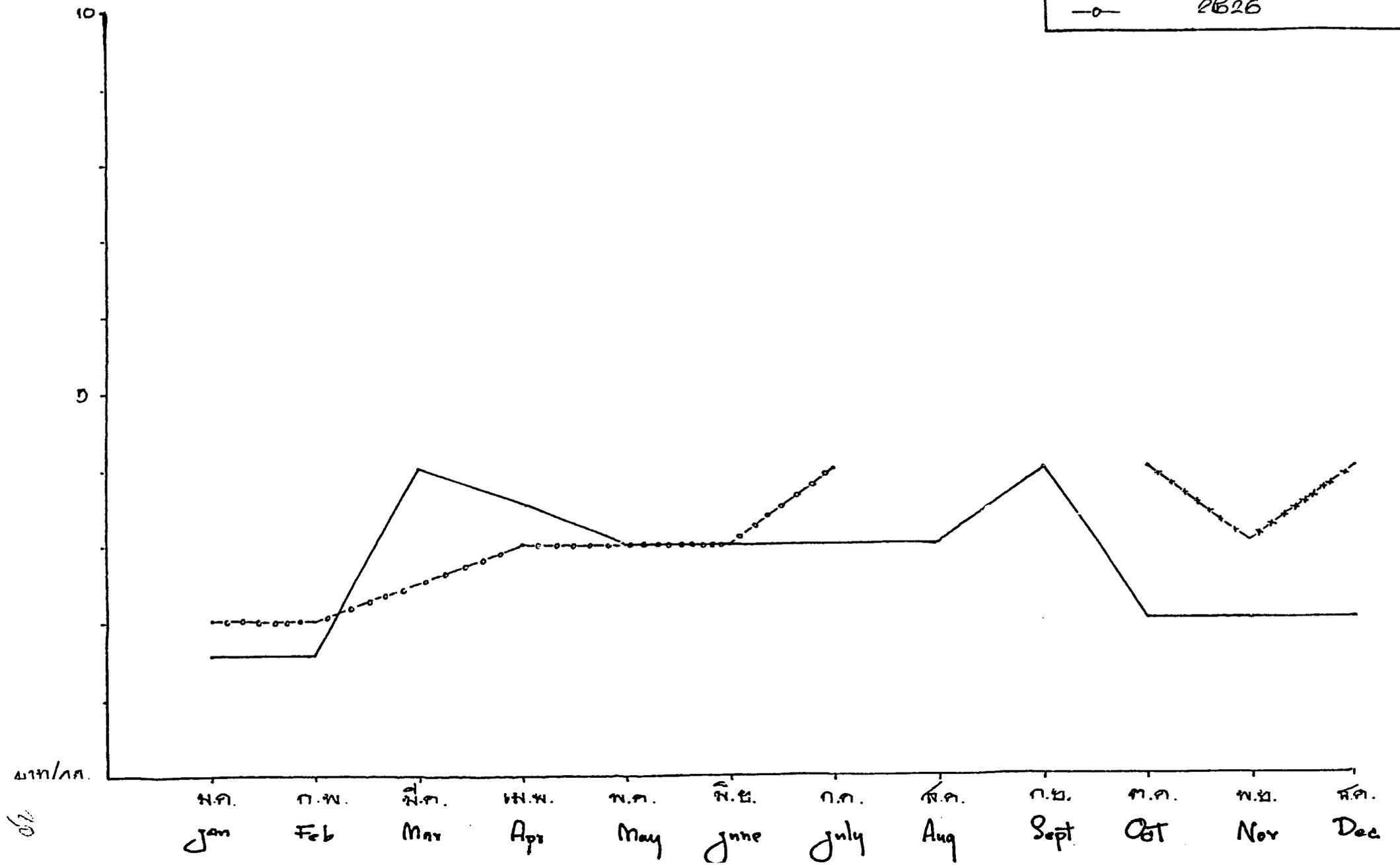
28

ไม้ตัด Kale
 ตลาด เชียงใหม่ เชียงใหม่
 MARKET 2524 Sakon Nakhon
 — 2525
 —o— 2526

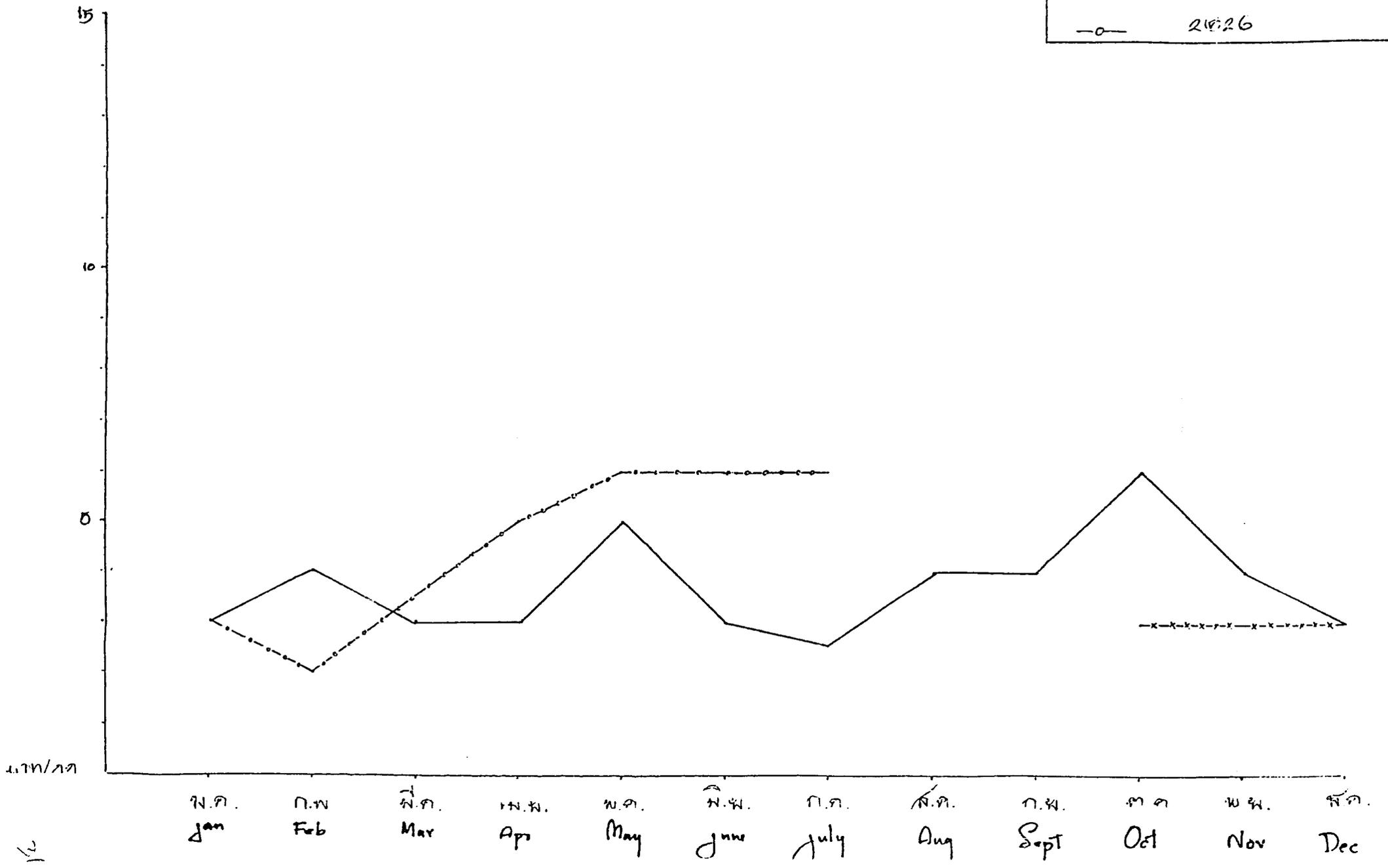


12

ปี Crop	วันที่ Marrow
ตลาด Market	ตลาดบ้านนาหว้า Sakon Nakhon
-x-	2524
—	2525
-o-	2526

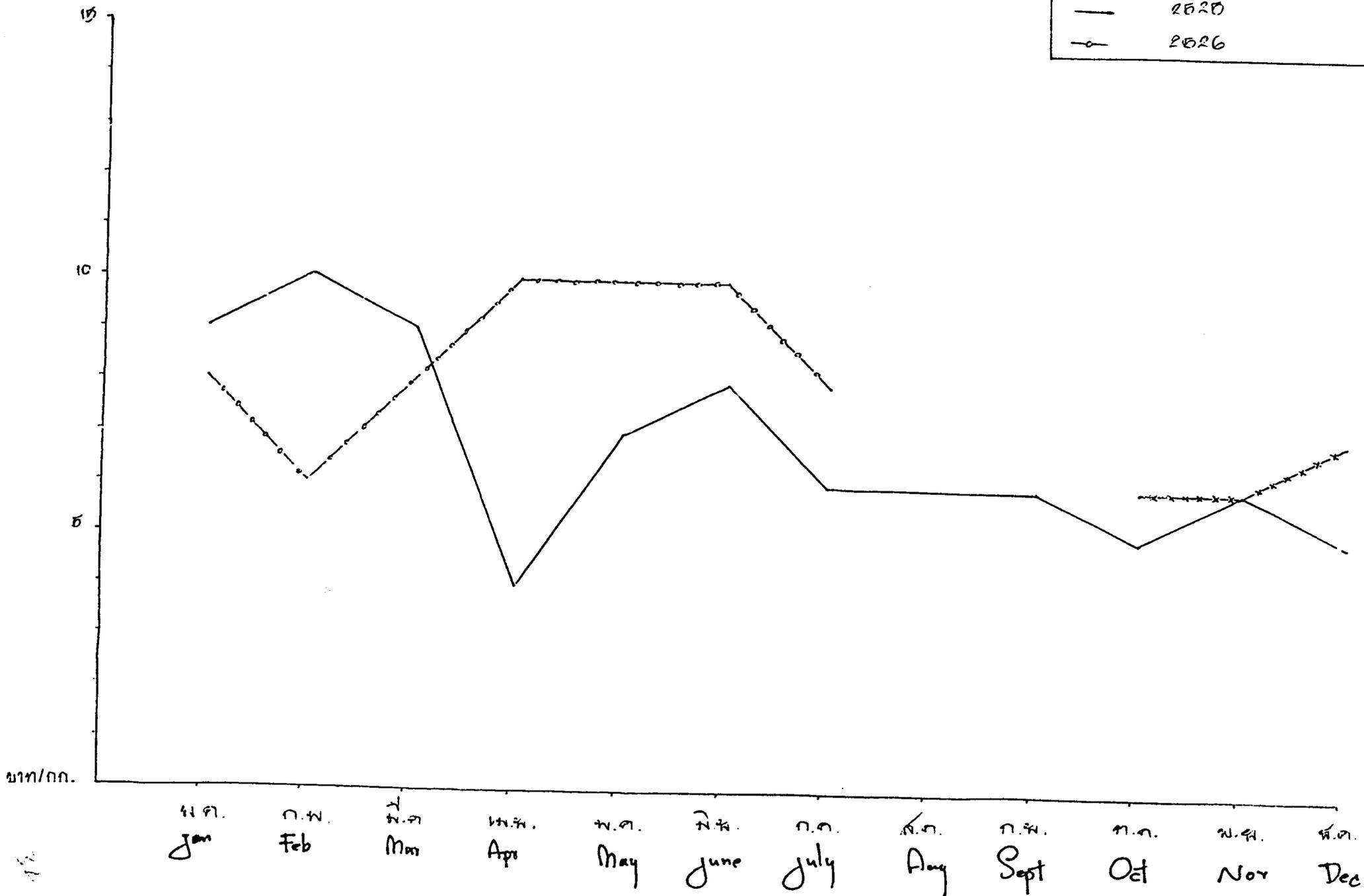


ชื่อ Crop	ชื่อเมือง	ชื่อตลาด
茄子	อำเภอเมือง	SAKON NAKHON
MARKET	2524	
	2525	
	2526	

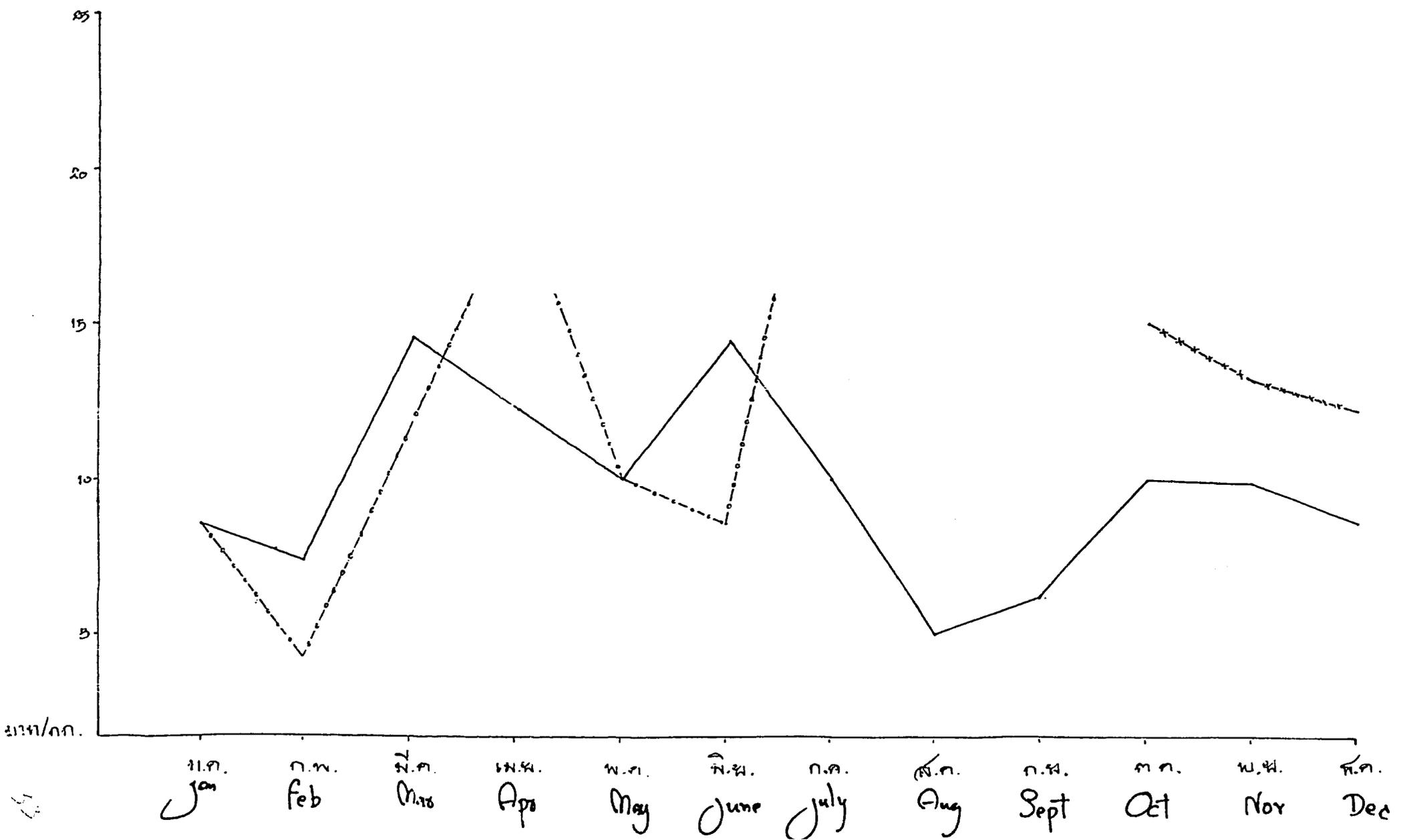


1/2

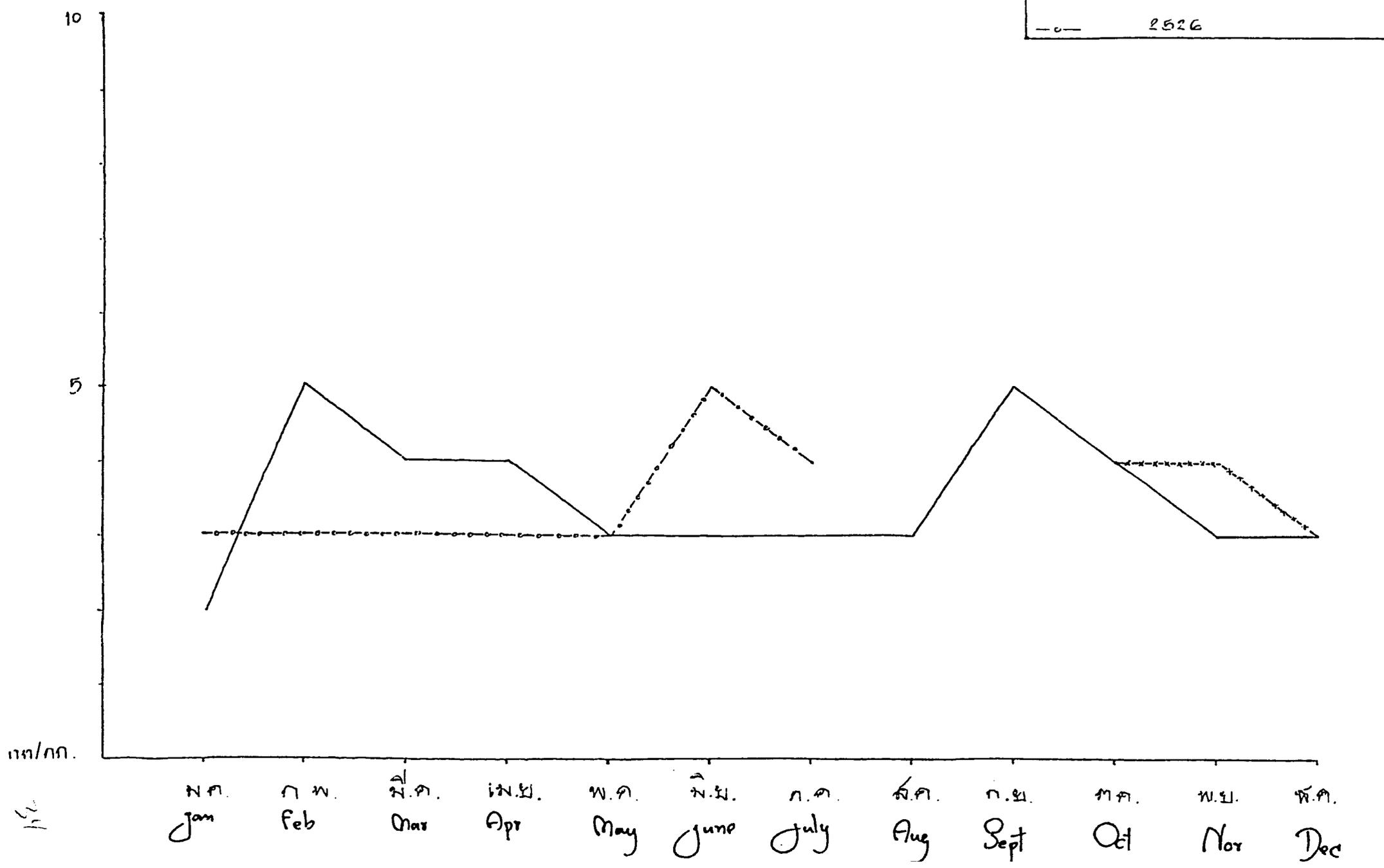
ไม้ Crop กวฟลย 17 yard long bean
 ตลาด ยี่เกอว เขตเทศบาลนคร
 MARKET SAKON NAKHON
 -x- ๒๕๒๕
 — ๒๕๒๖
 -o- ๒๕๒๖



ไม้กระถาง Shallots
 ตลาดสด ตลาดสด
 MARKET 2524 Sakon Nakhon
 — 2525
 -o- 2526



ชนิด Crop	พืชมะเขือเทศ
ตลาด MARKET	อำเภอเมืองสกลนคร SAKON NAKHON
-x-	2524
—	2525
-o-	2526



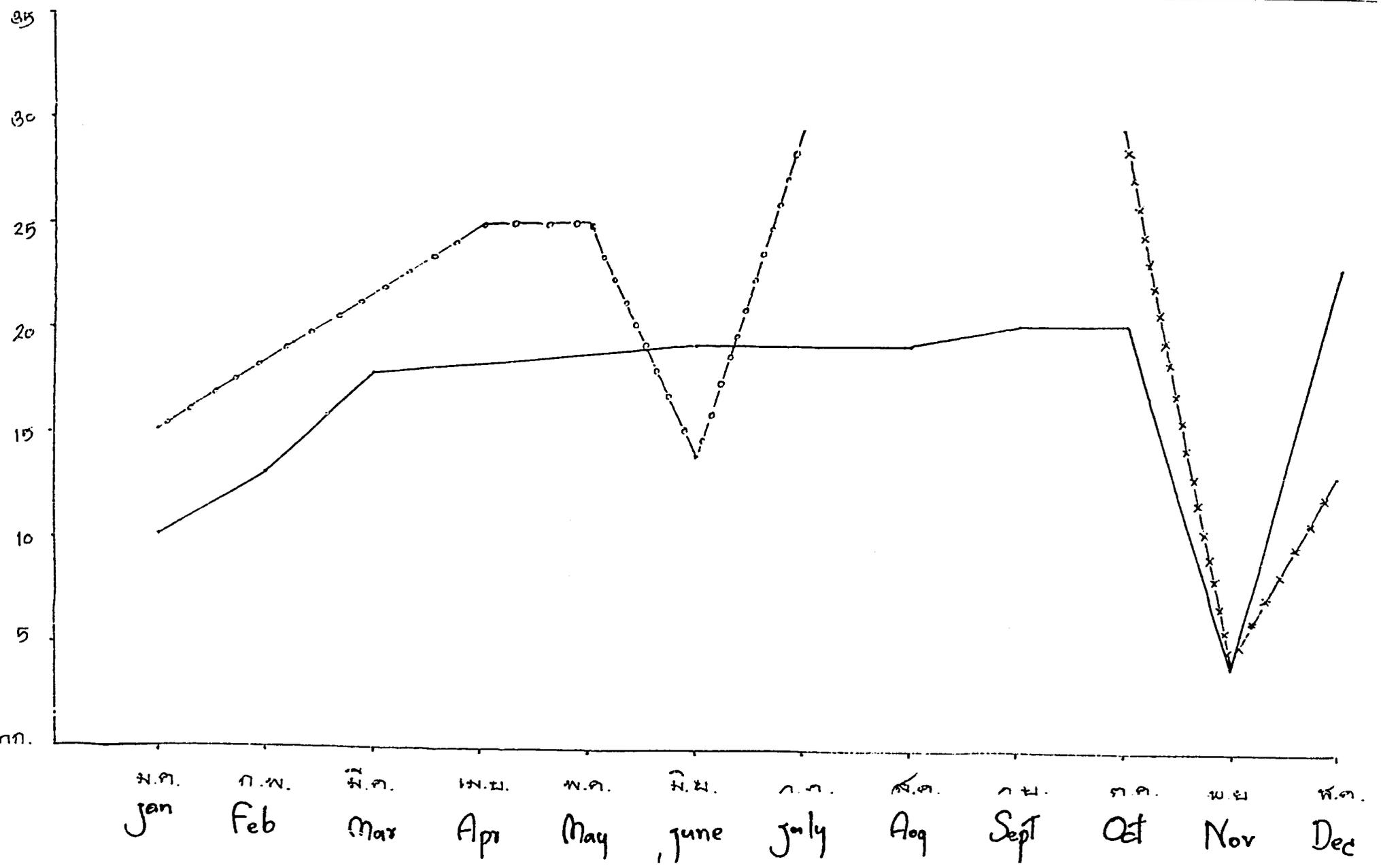
2. Phangkhon District Market
Amphoe Phangkhon, Sakon Nakhon

2524 = 1981 = -- x -- x --

2525 = 1982 =

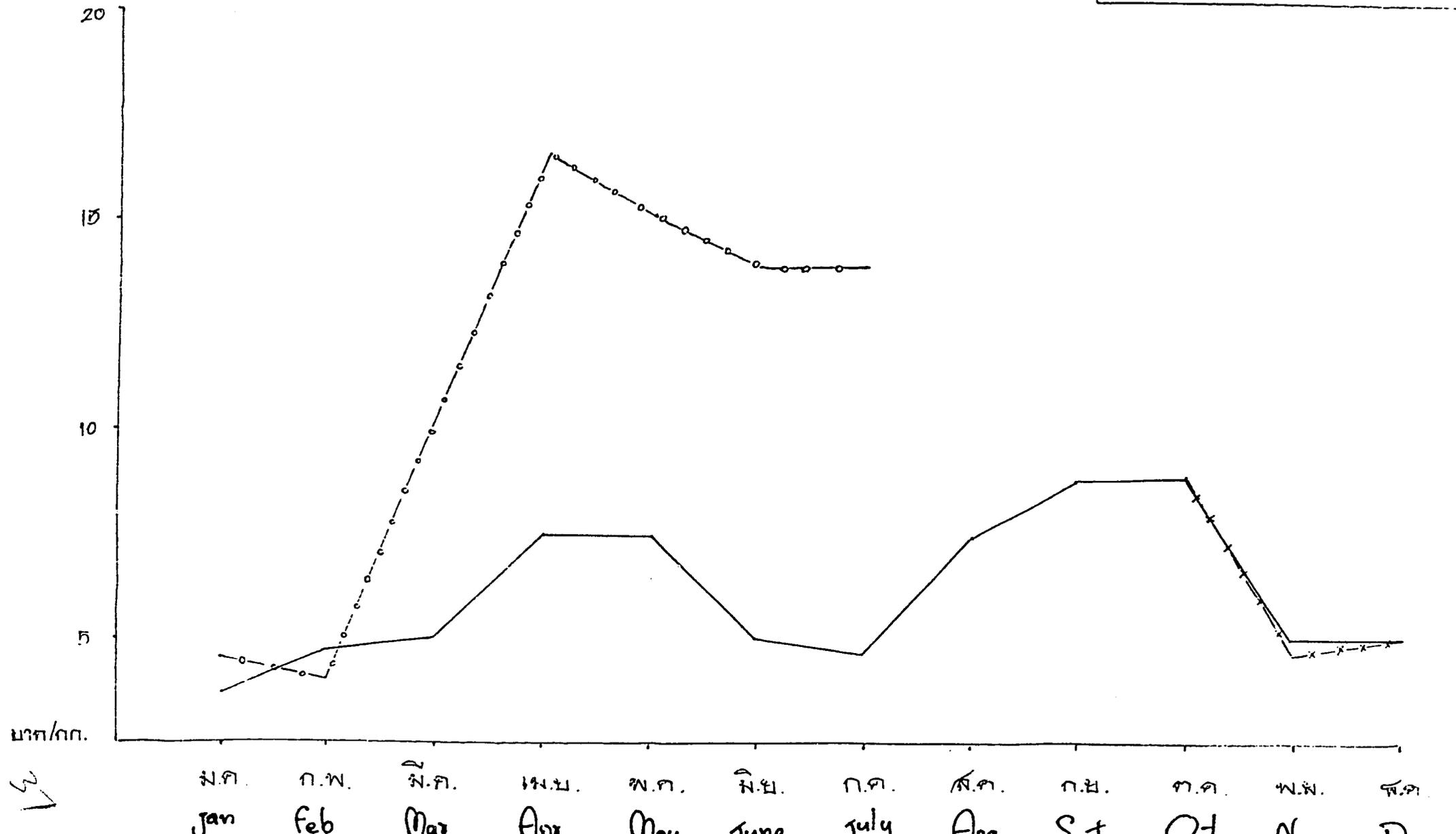
2526 = 1983 = -- o -- o --

ผักกาดขาว Cauliflower
 ตลาด ฟังกทอน
 MARKET 2524 Phangkhon
 — 2525
 -o- 2526

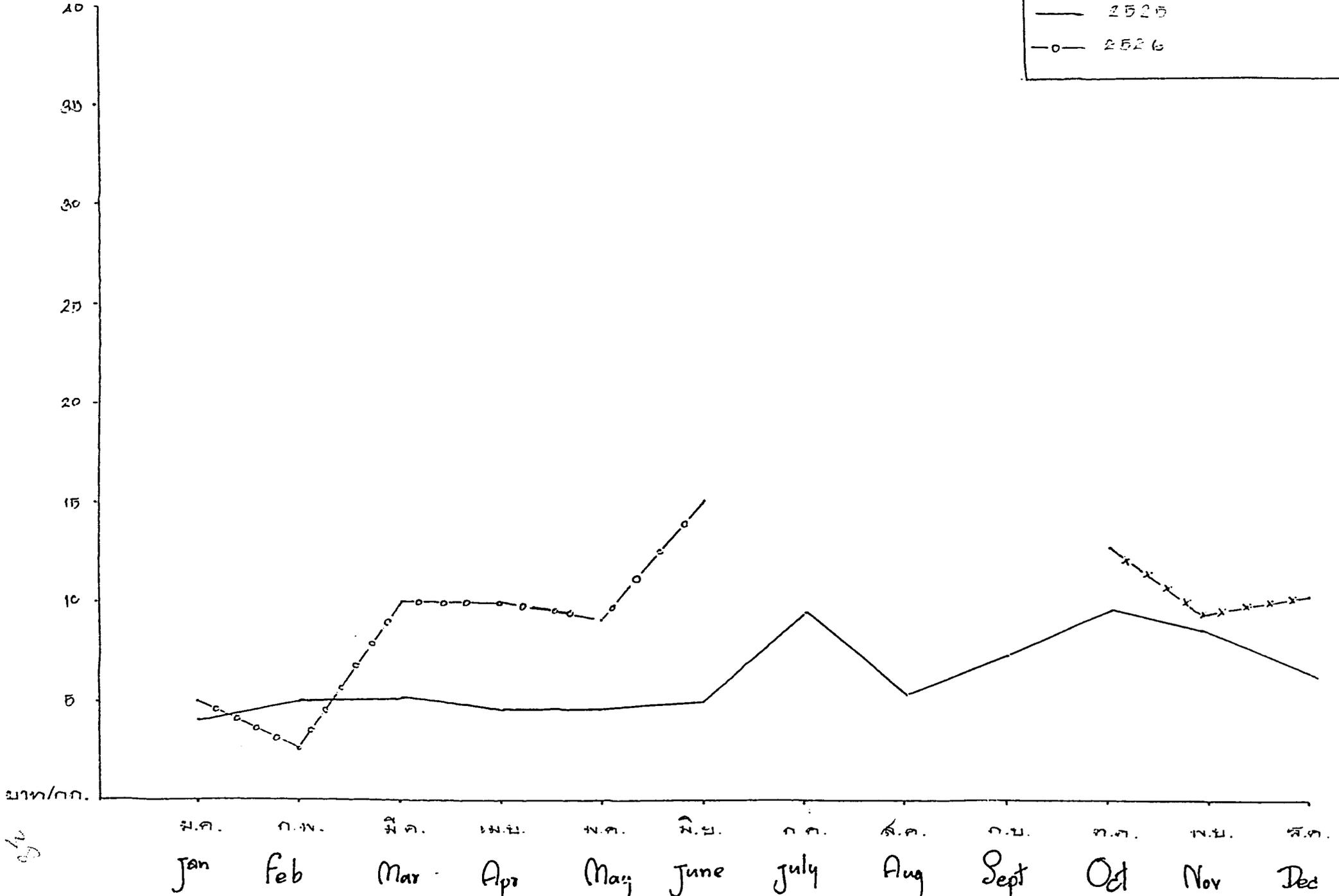


บาท/กก.
25

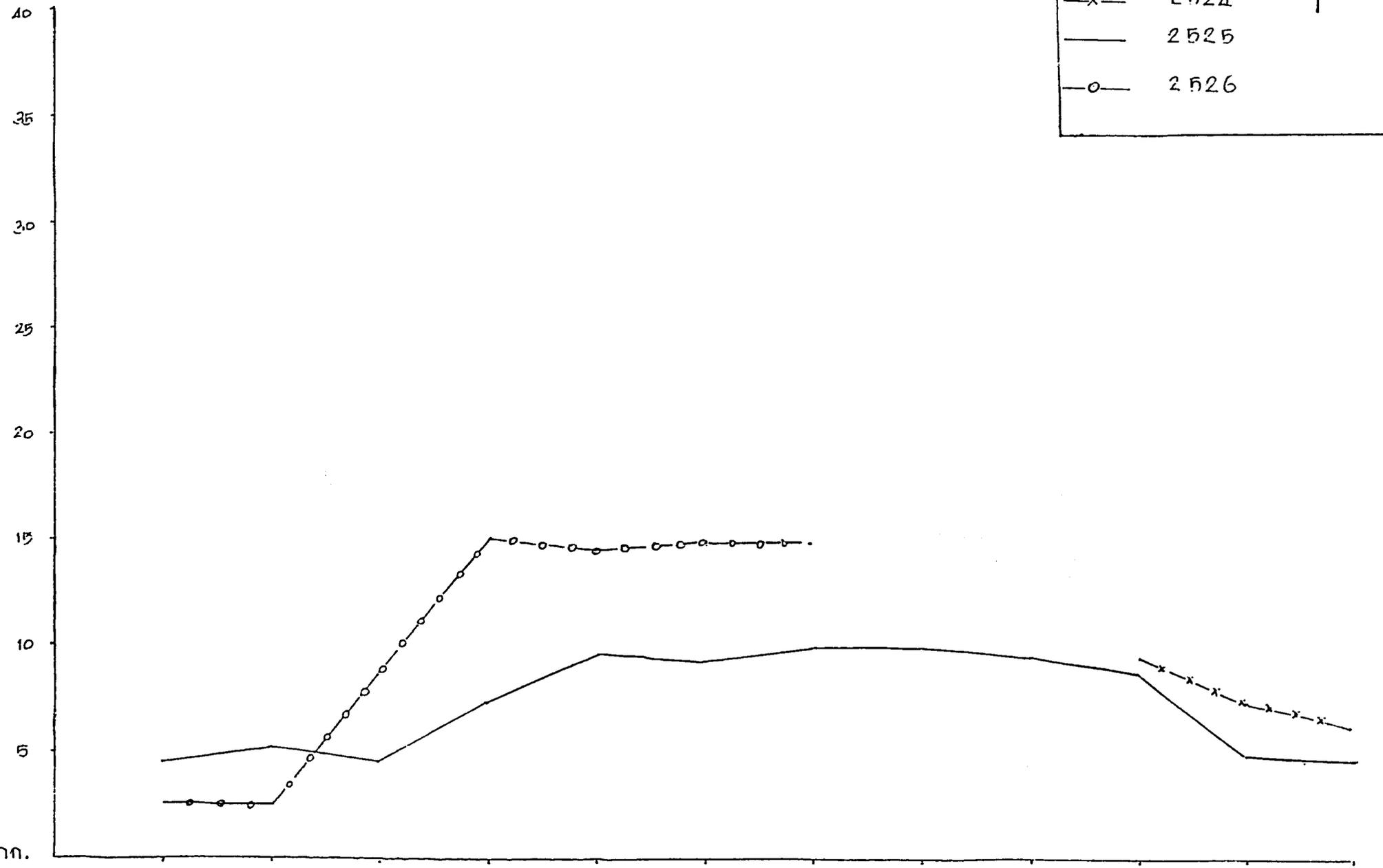
พืช Crop กระหล่ำปลี Cabbage
 ตลาด ผักสด ฟังโหว
 Market PHANGHON
 —x— 2524
 — 2525
 —o— 2526



Crop Lettuce
 ตลาด อ่างทอง พังโคน
 Market PHANGKHON
 -x- 2524
 — 2525
 -o- 2526



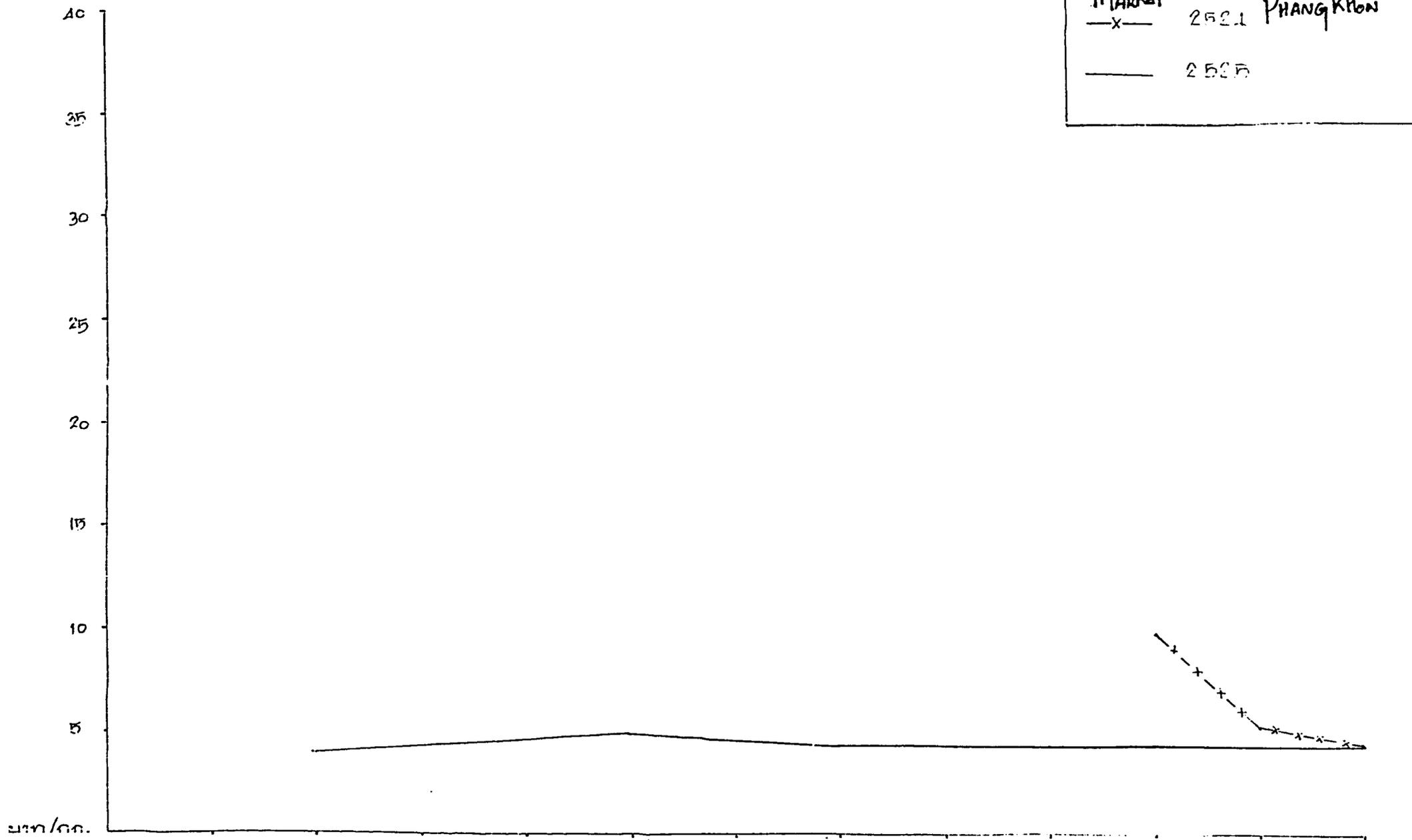
ไม้ พริกไทย
 Crop Chinese Cabbage
 ตลาด 2524 PHANGKHON
 2525
 2526



บาท/กก.

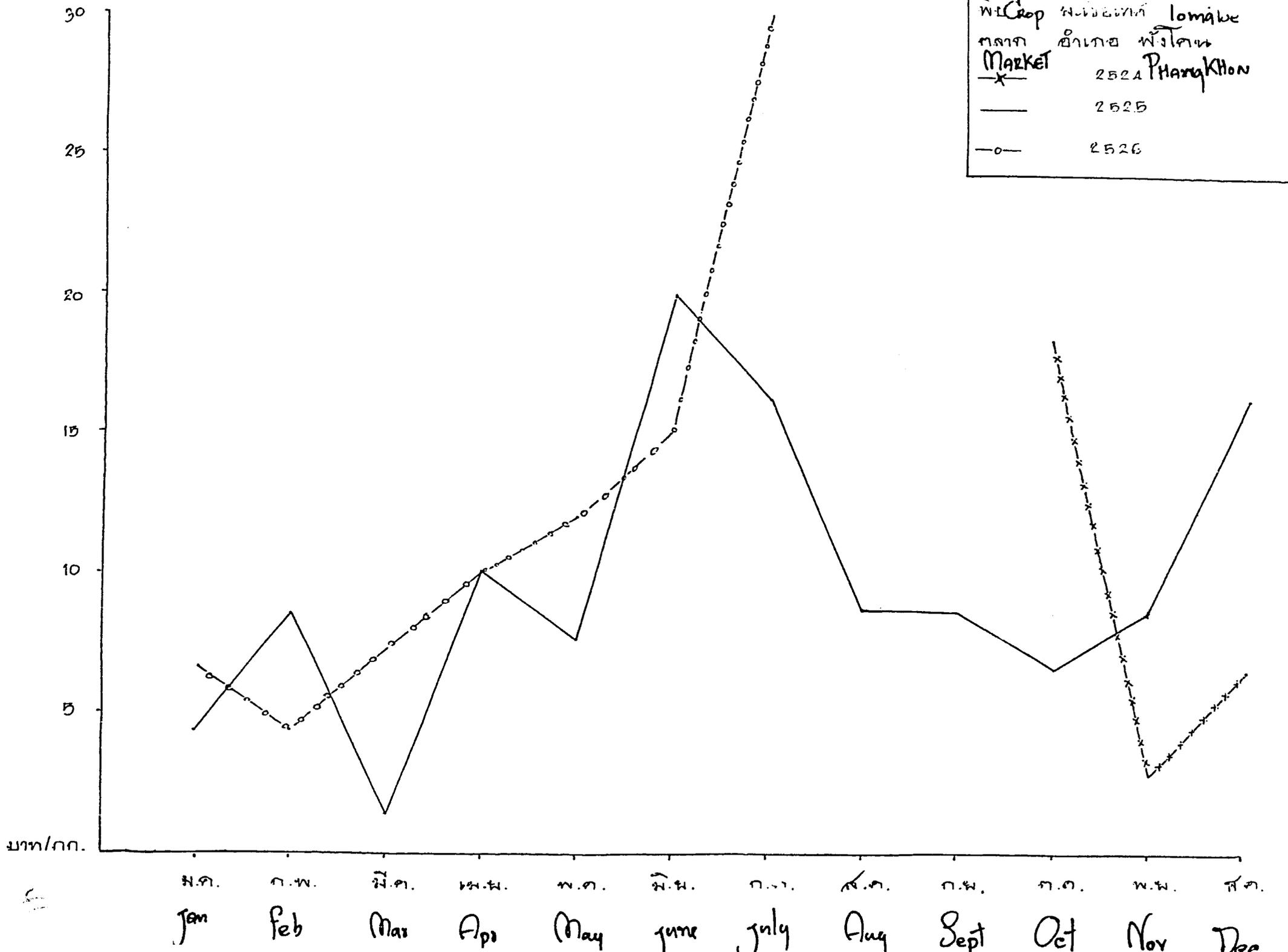
๒๕
 ๒๕.๑. ๒๕.๒. ๒๕.๓. ๒๕.๔. ๒๕.๕. ๒๕.๖. ๒๕.๗. ๒๕.๘. ๒๕.๙. ๒๕.๑๐. ๒๕.๑๑. ๒๕.๑๒.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

พืช ผักกาดเขียวปลี
 Crop: Green Mustard
 ตลาด 2521 PHANG KHON
 2525

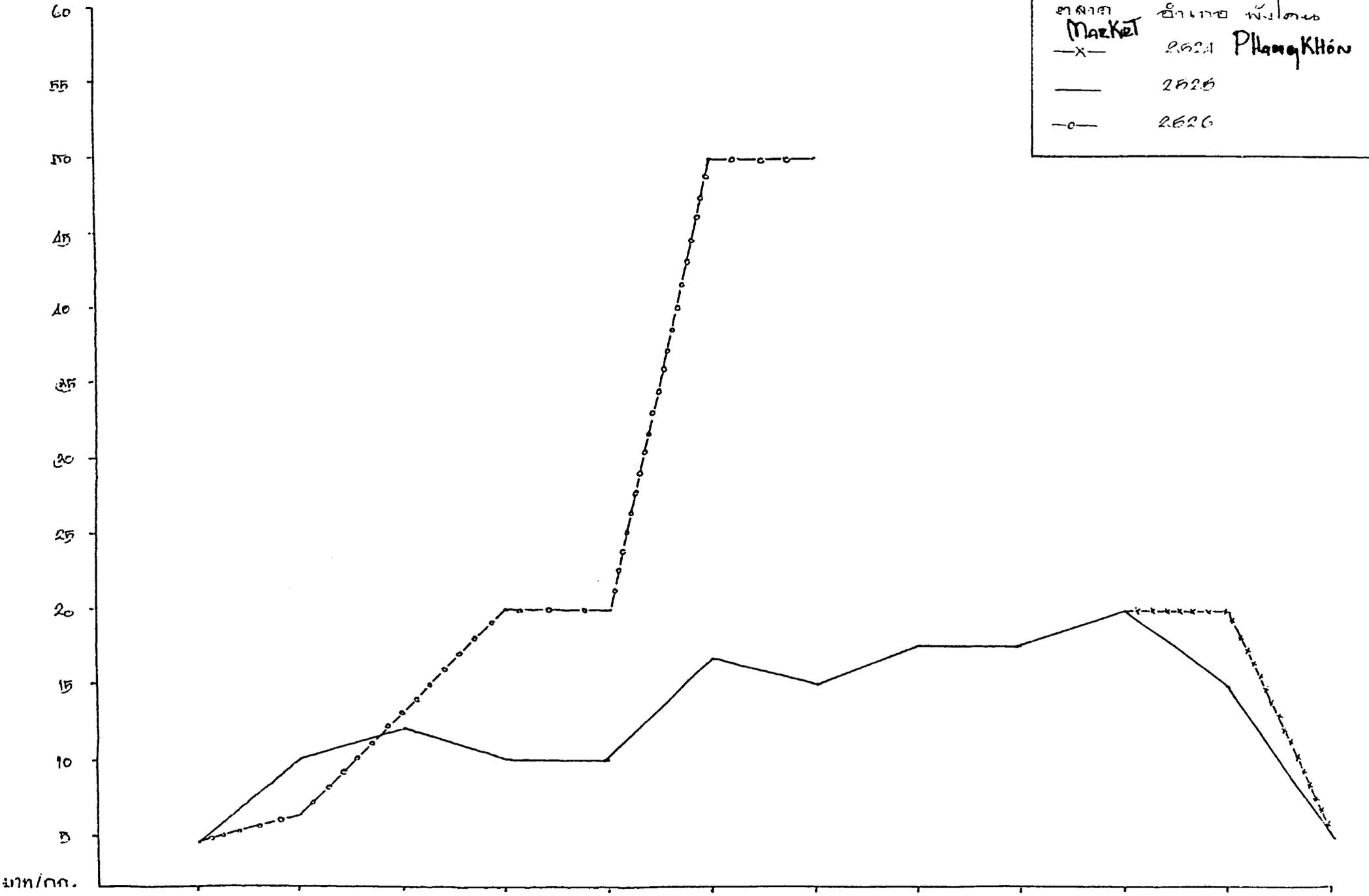


บาท/กก.
 N.B. N.P. S.B. N.E. W.B. S.E. N. S. W. S. N. N. S. N.P. N.E. N.W. N.E. N.P.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

ปี Crop พืชปลูกใหม่ 10ไร่
 ตลาด อู่ทอง พืชปลูก
 MARKET 2524 Phangkhon
 — 2525
 -o- 2526



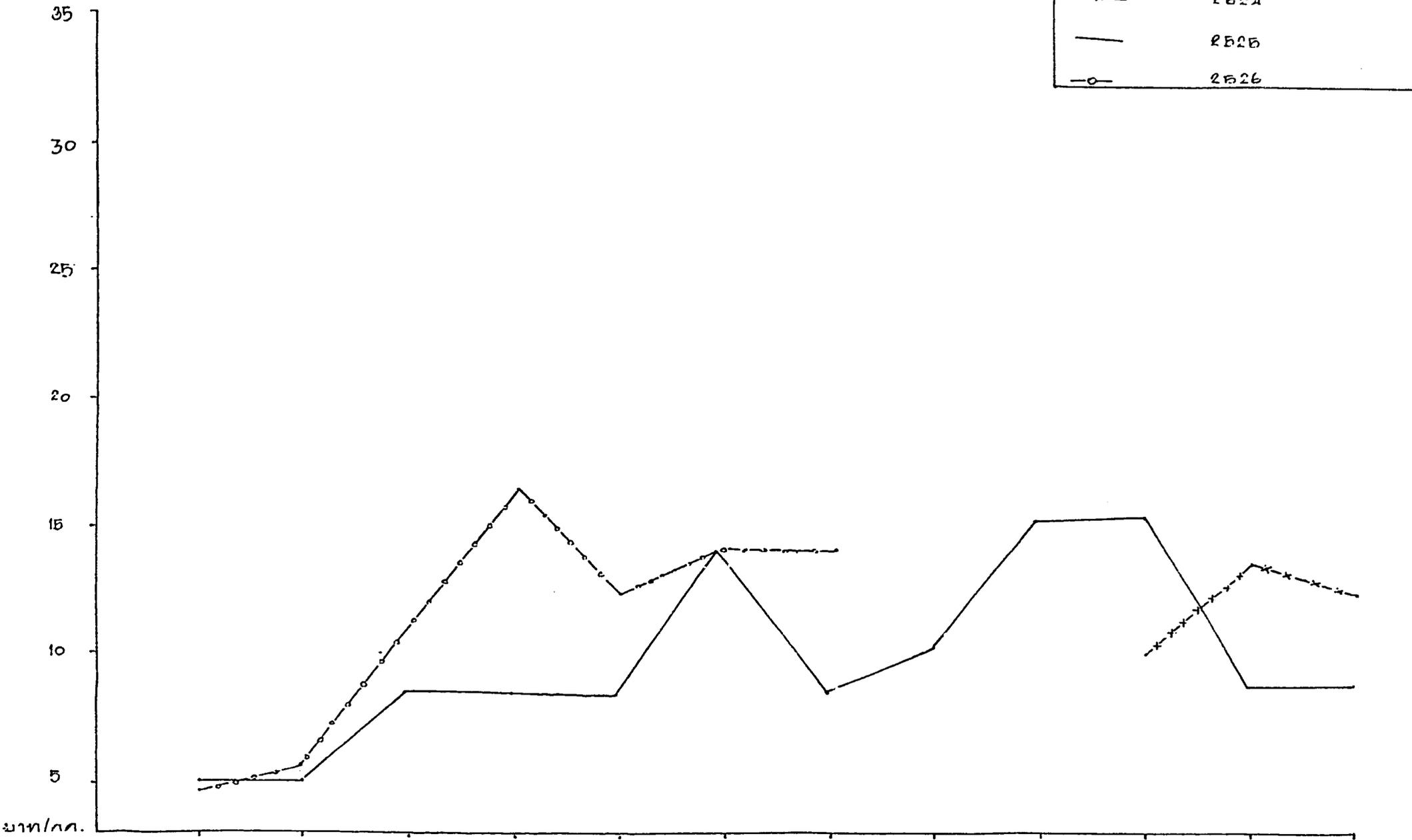
ไม้ Corop ไม้ Coriander
 ตลาด Market
 2621 Phangkhon
 2625
 2626



บาท/ก.

1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1. 1.1.1.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

ผัก Kale
 ตลาด อีท่าเสา พิษณุโลก
 MARKET PHANGKHON
 -x- 2524
 — 2525
 -o- 2526

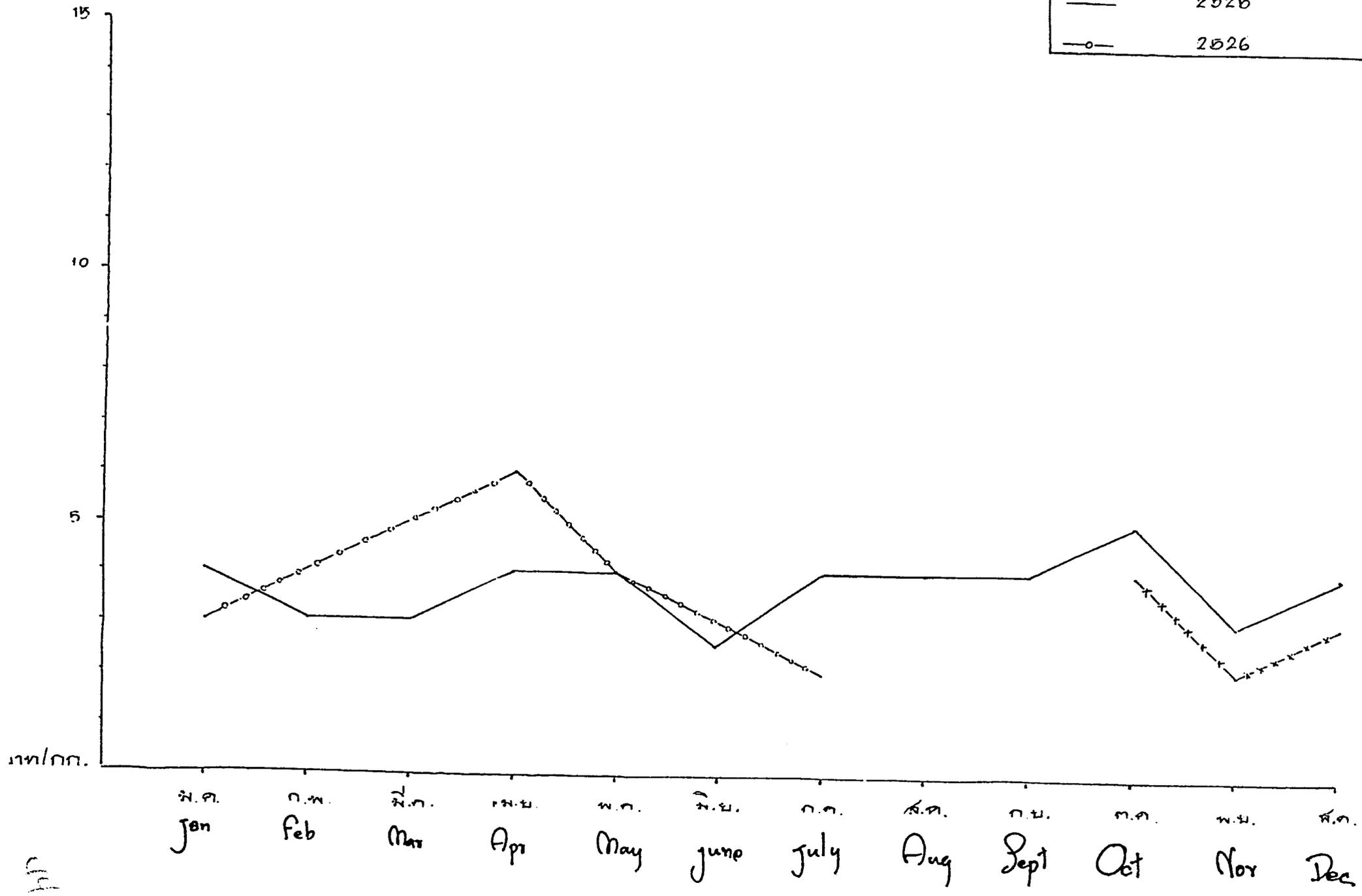


บาท/กก.

ม.ค. ก.พ. มี.ค. เม.ย. พ.ค. มิ.ย. ก.ค. ส.ค. ก.ย. ต.ค. พ.ย. ธ.ค.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

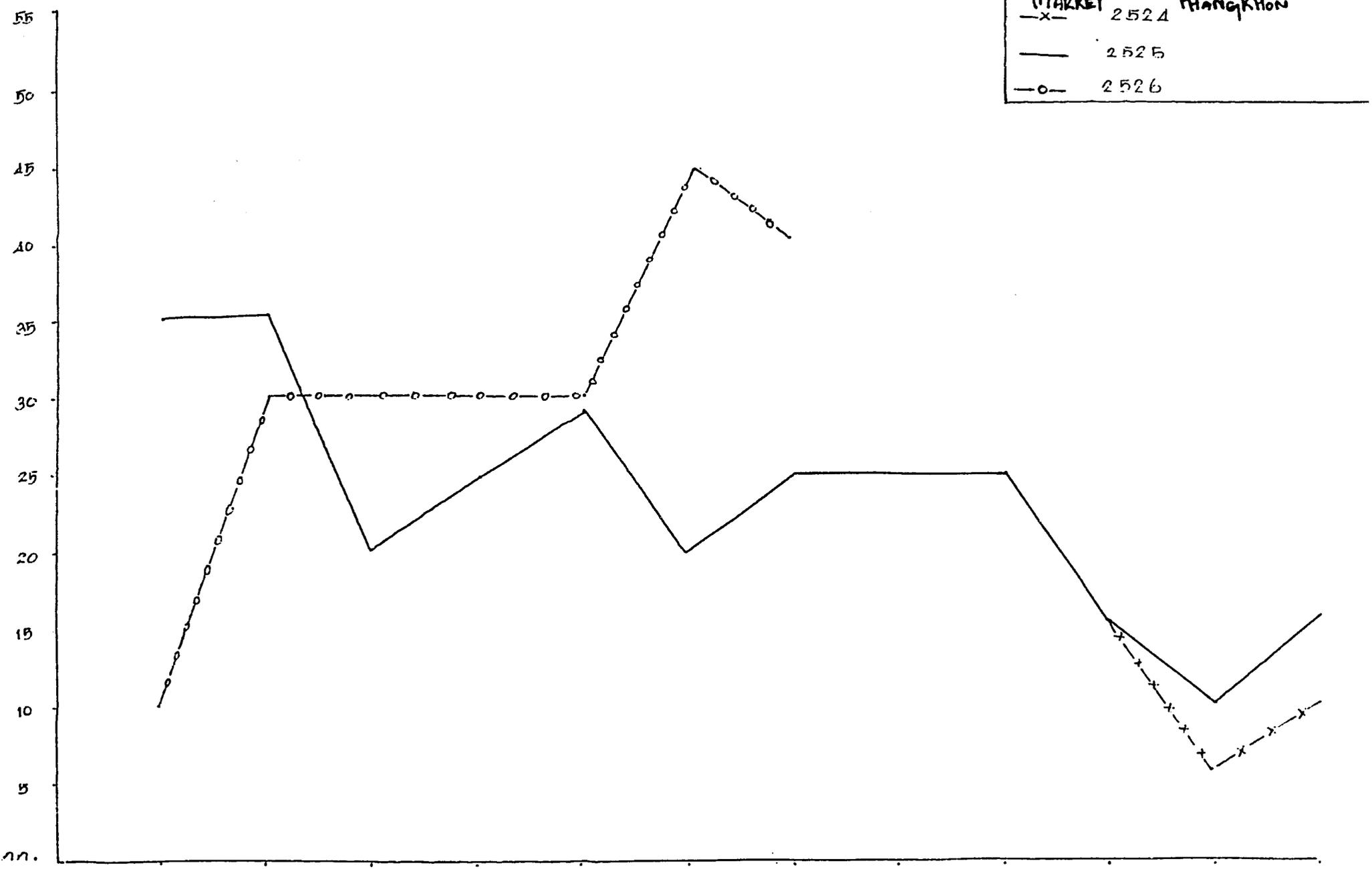
4

ตลาด	อำเภอ พังโคน
MARKET	2524 Phang Khon
—x—	2525
—o—	2526



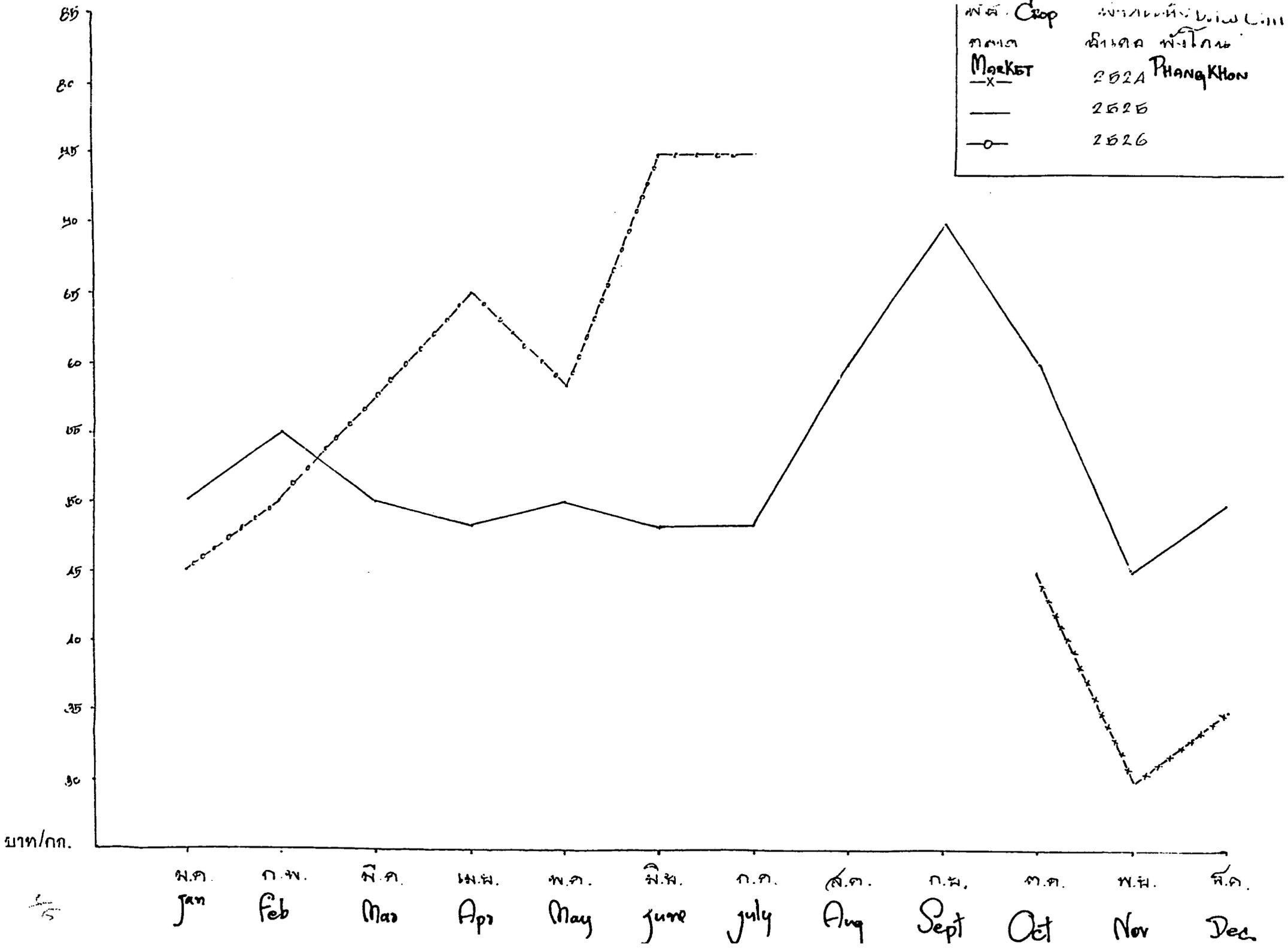
11

พืชปลูก Chili
 ตลาด เชียงใหม่
 MARKET 2524 Phangkhon
 —x— 2524
 — 2525
 —o— 2526



บาท/กก.
 5
 10
 15
 20
 25
 30
 35
 40
 45
 50
 55

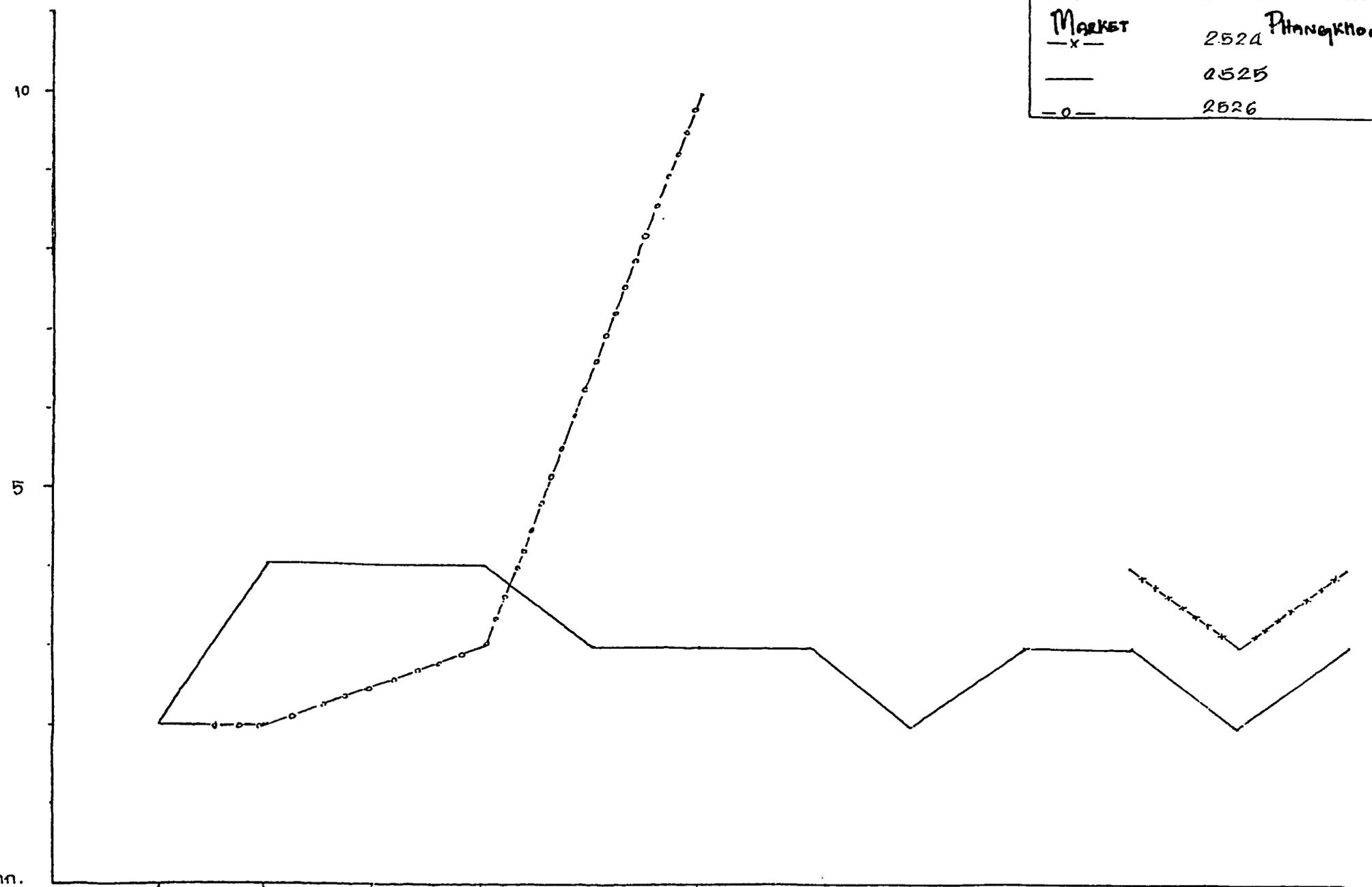
ม.ค. ก.พ. มี.ค. เม.ย. พ.ค. มิ.ย. ก.ค. ส.ค. ก.ย. ต.ค. พ.ย. ธ.ค.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec



ไม้. ปลูก ไม้ปลูกในดิน
 ปลูก ปลูก ไม้ปลูก
 Market 2524 Phangkhon
 —x— 2525
 —o— 2526

บาท/กก.
1/5

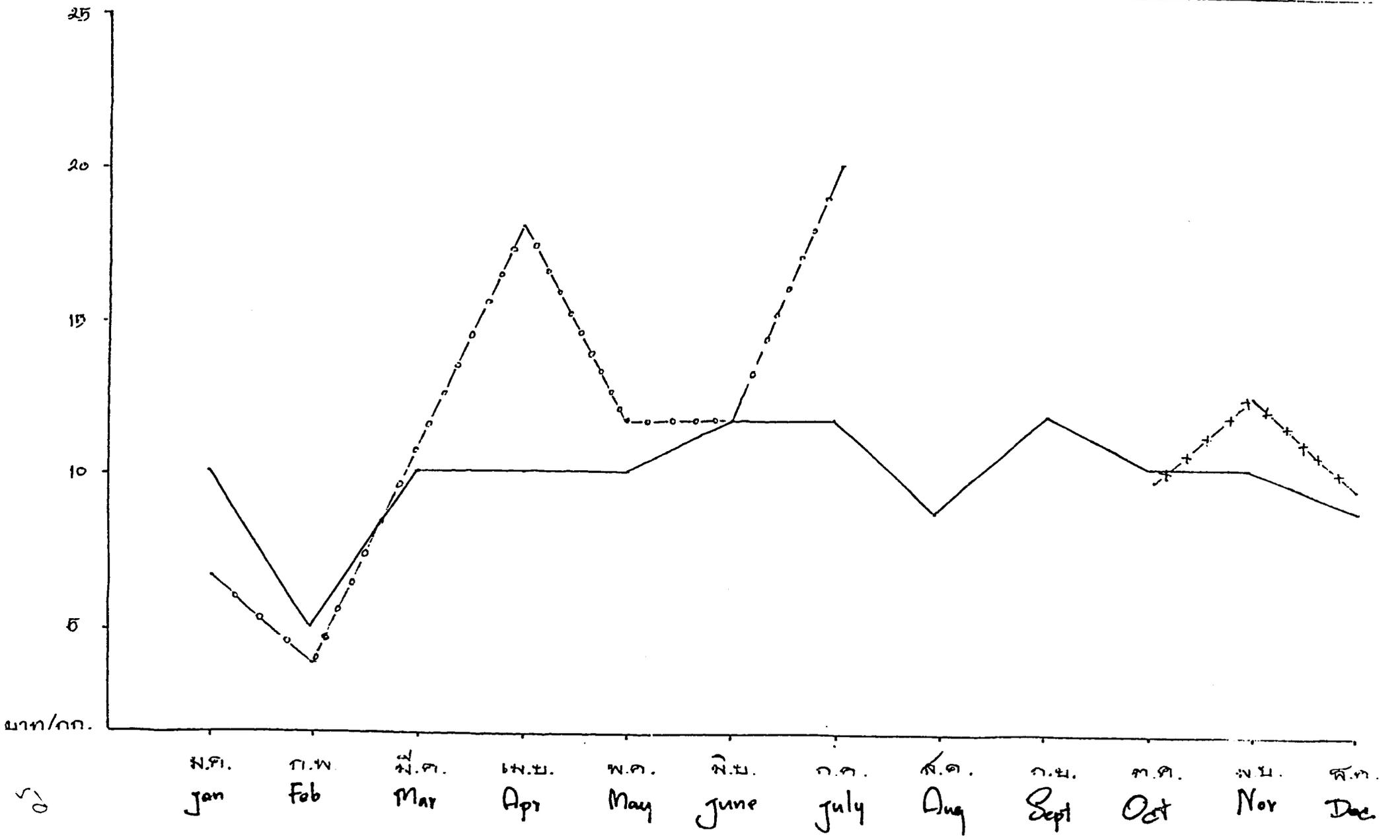
ชนิด Crop	แม่ไก่ Marrow
ตลาด	เชียงใหม่ เชียงใหม่
Market	2524 Phiangkhon
—	2525
—o—	2526



บาท/กก.

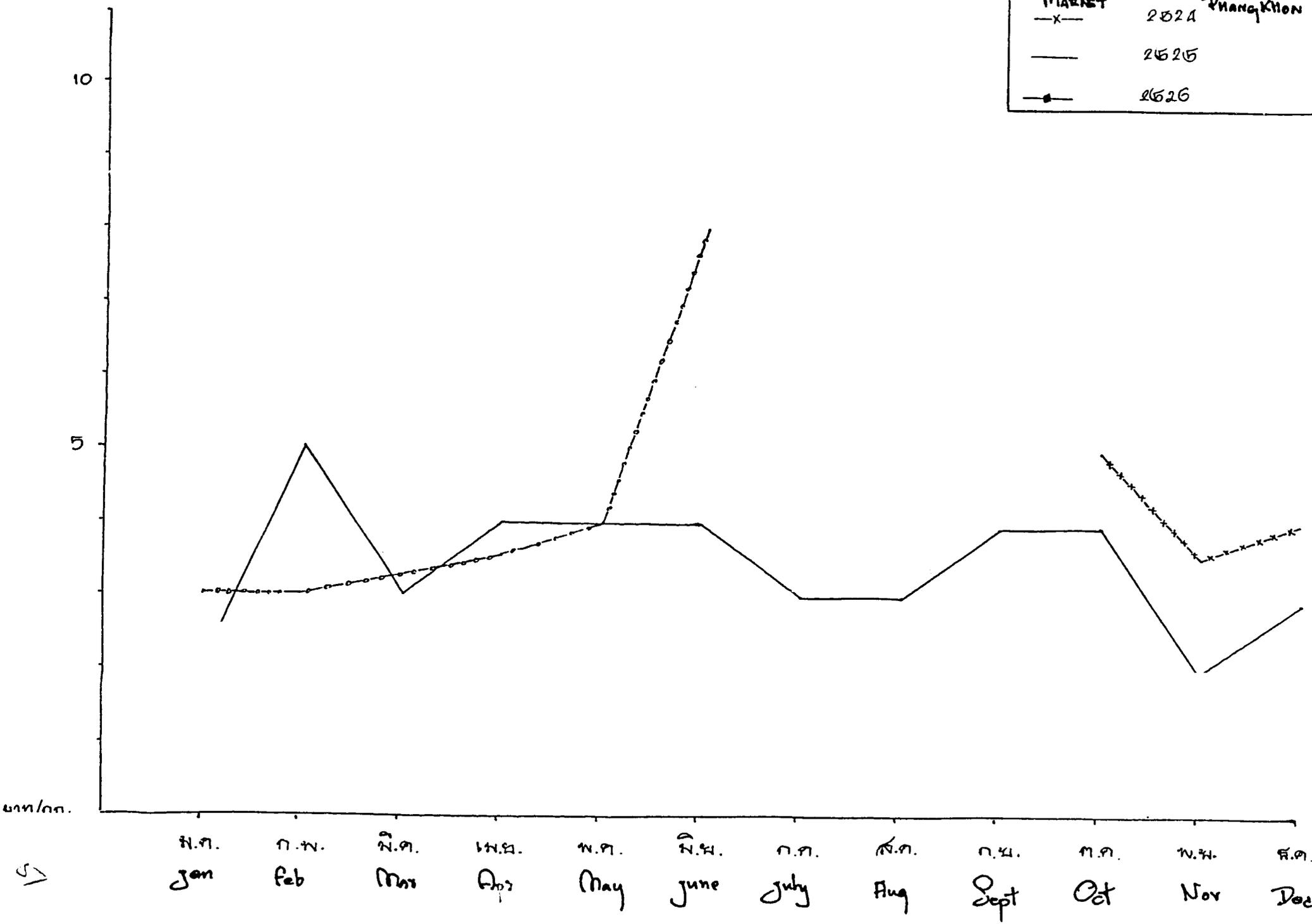
ม.ก. ก.พ. มี.ค. เม.ย. พ.ค. มิ.ย. ก.ค. ส.ค. ก.ย. ต.ค. พ.ย. ธ.ค.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec.

Market	ปี ๒๕๒๑	Phangkhon
—x—	๒๕๒๑	
—	๒๕๒๕	
—o—	๒๕๒๖	



50

ปี Crop ปีปลูก Pumpkin
 ตลาด อำเภอ พังโคน
 Market 2524 PhangKhan
 —x— 2525
 — 2526
 —●— 2526



บาท/กก.
5

3. Sawangdaengin District Market
Amphoe Sawangdaengin, Sakon Nakhon

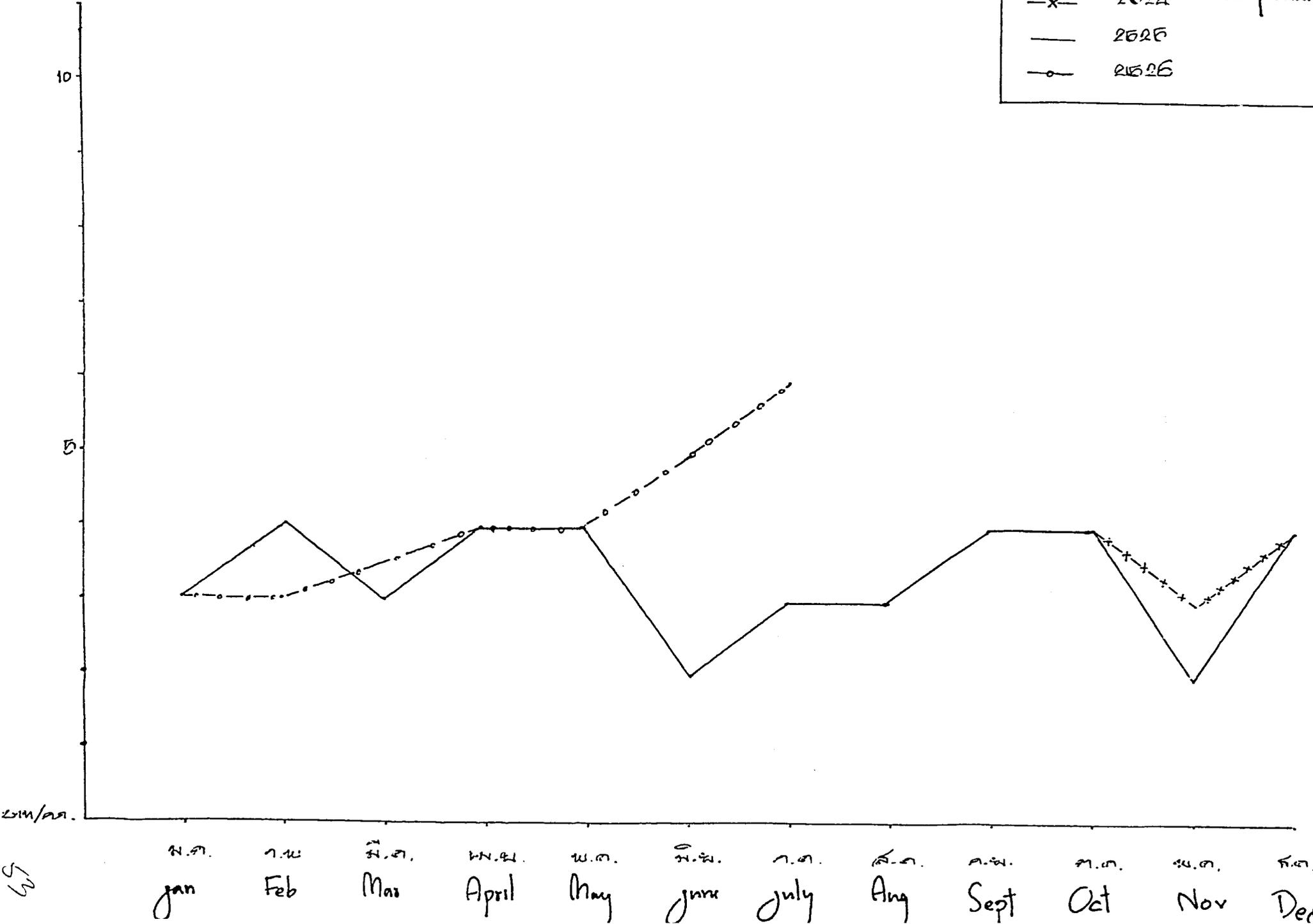
2524 = 1981 = -- x -- x --

2525 = 1982 =

2526 = 1983 = -- o -- o --

พืช Crop พืช pumpkin
 ตลาด ตลาดวังนาคินทร์
 MARKET 2524 SAWANG DAENDIN

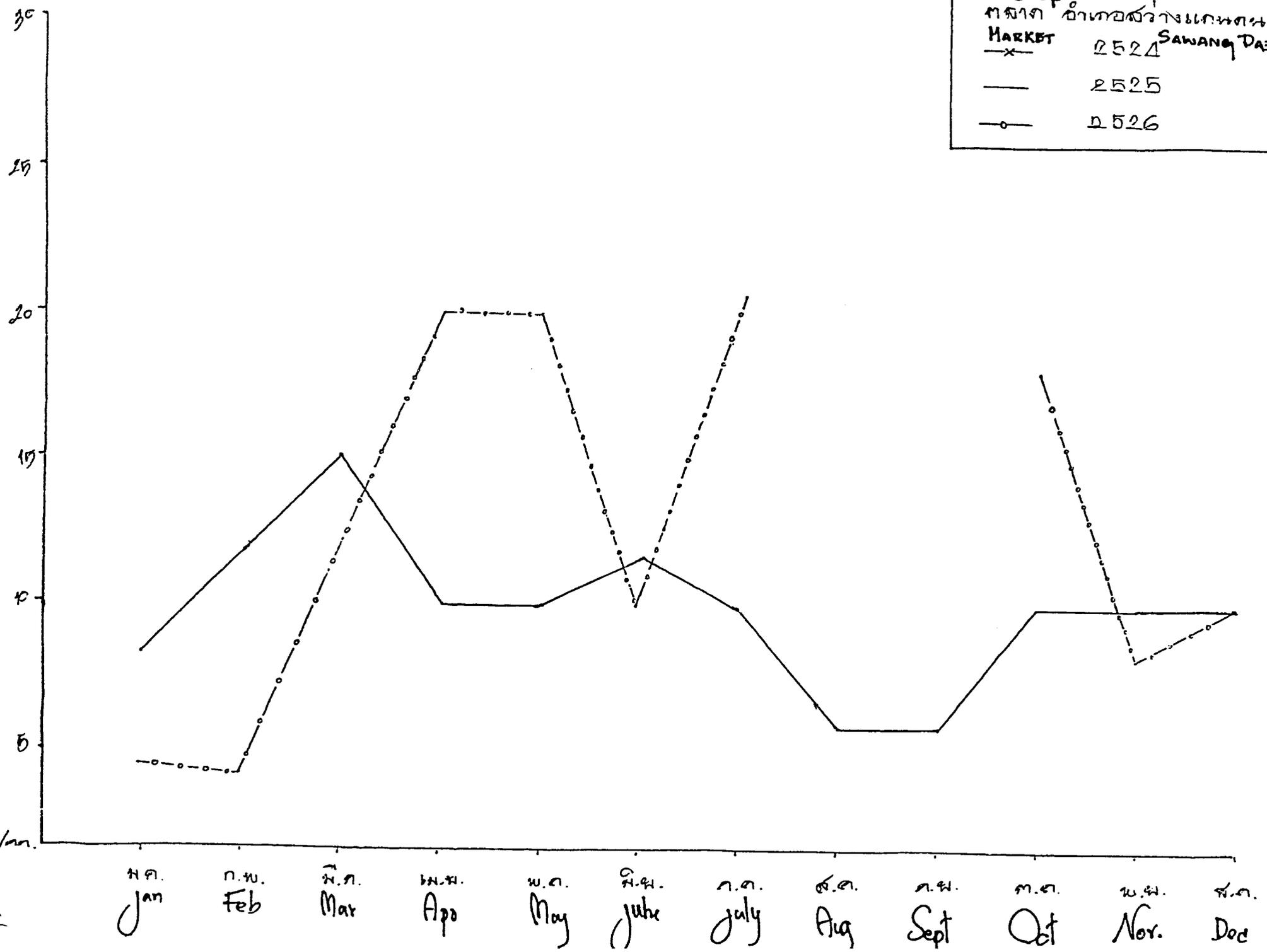
— 2525
 —○— 2526



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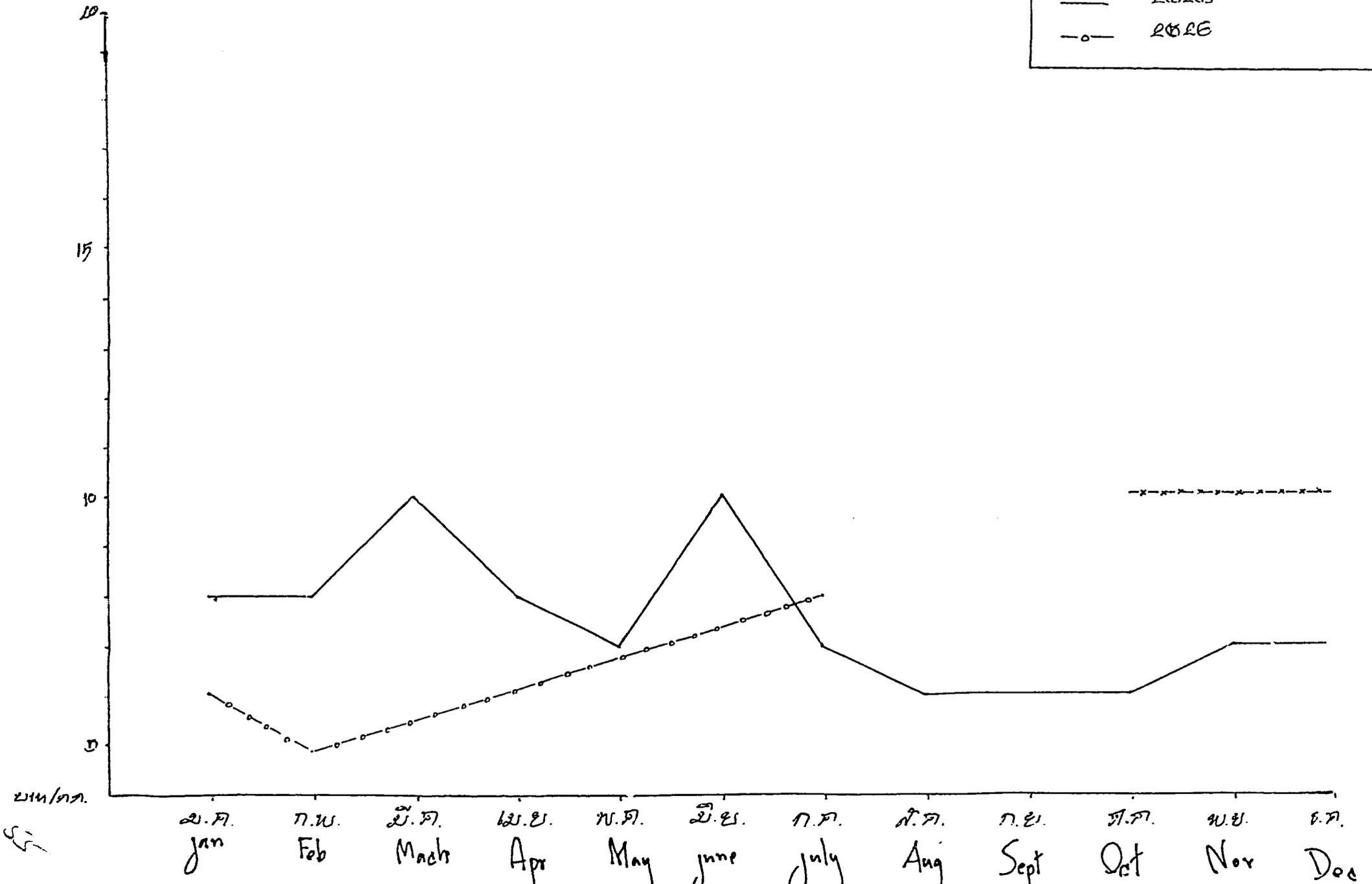
บาท/กก.

ปลูก หอมหัวปลีพันธุ์ Shallots
 ปลูกที่ อำเภอวังไทร
 MARKET 2524 SAWANG DAENDI
 2525
 2526

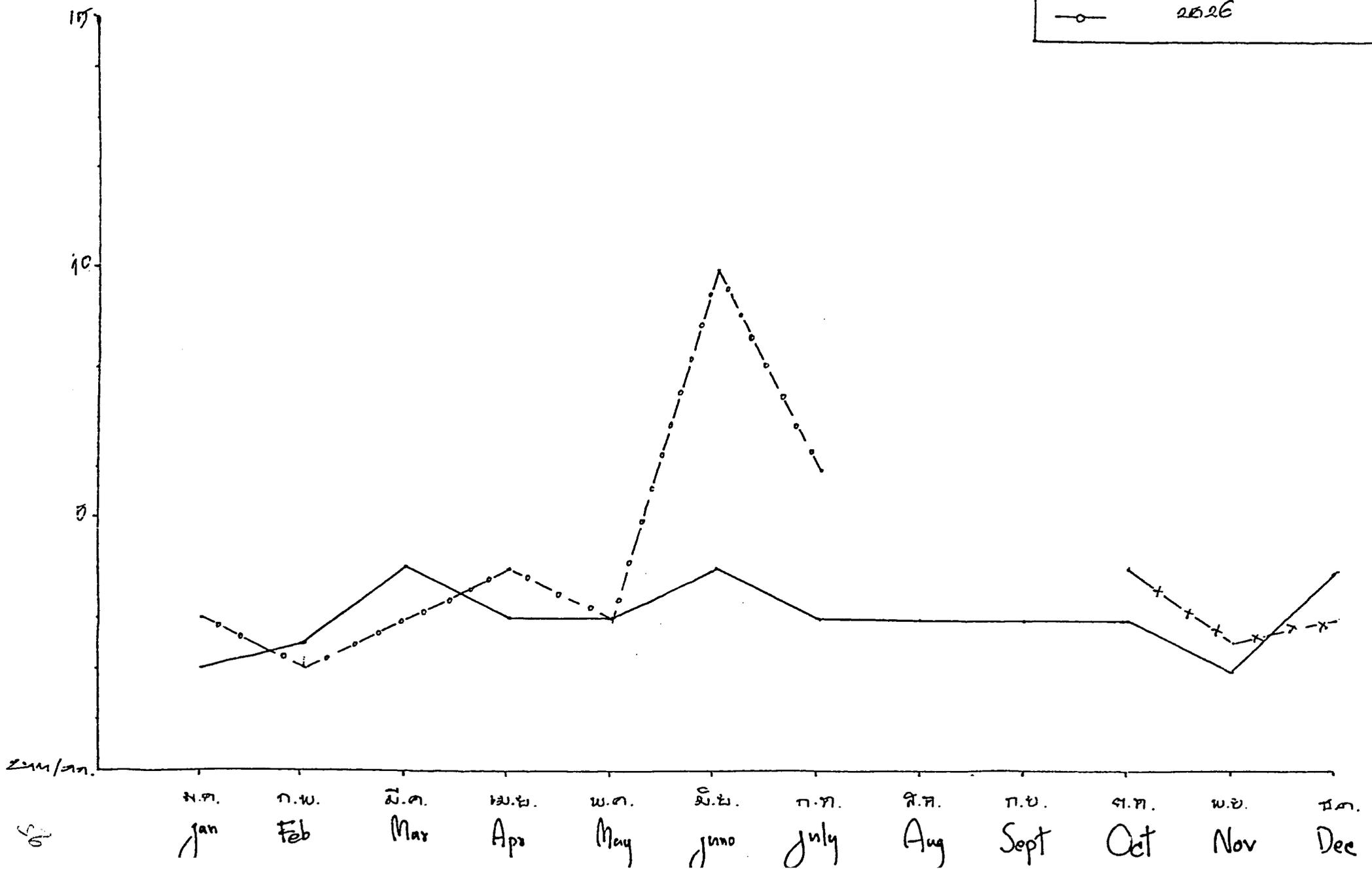


52

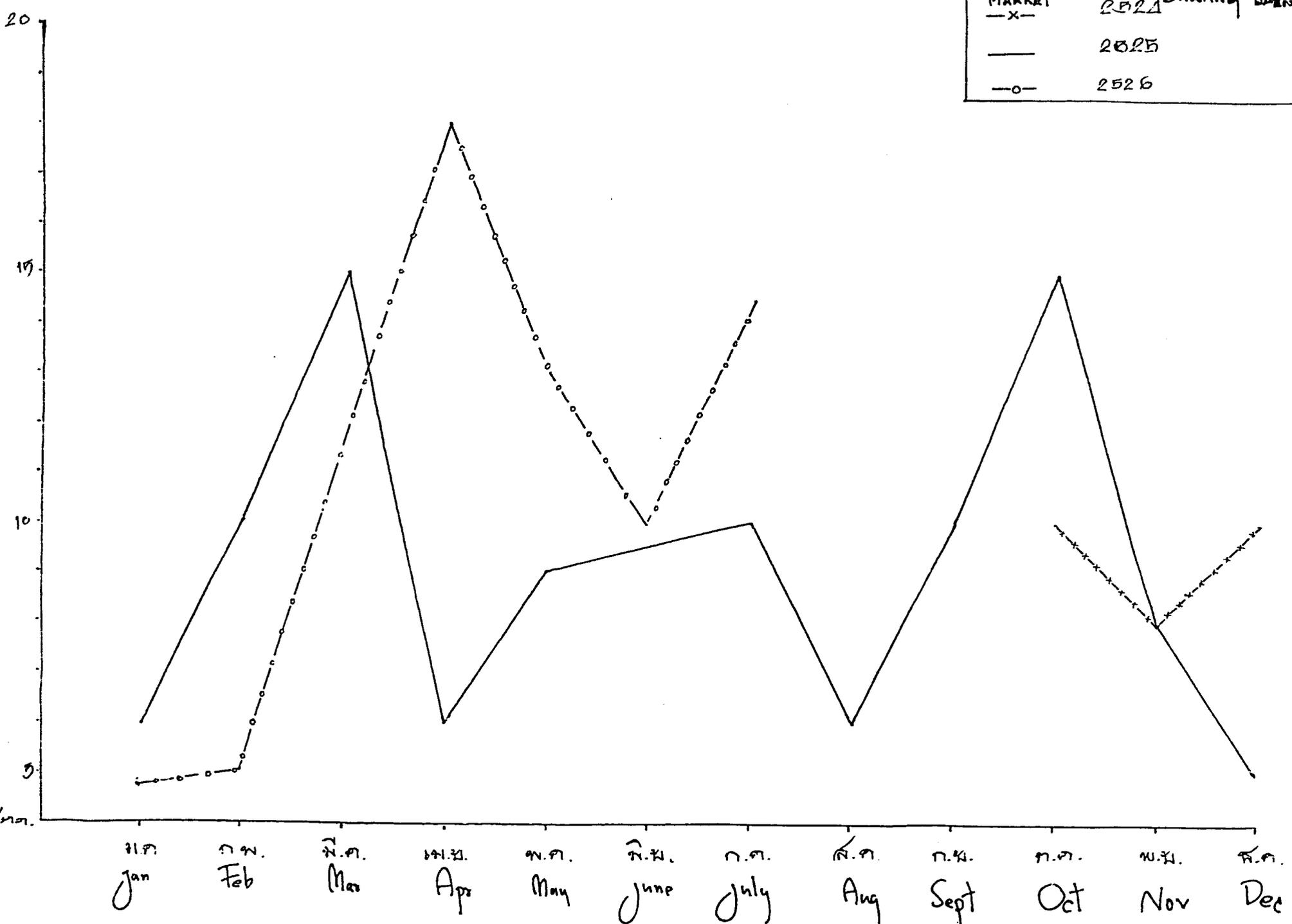
ปี ๒๕๖๒ ปีที่ปลูกข้าว Yard long bean
 ตลาด ตลาดบ้านดอน
 MARKET ๒๕๖๒ SAWANG DABUDIM
 —x— ๒๕๖๒
 — ๒๕๖๒
 —o— ๒๕๖๒



ไม้กวาด Market Mallow
 ตลาด อำเภอวังน้อย
 MARKET 2024 SAWANG DAENDIN
 — 2025
 -o- 2026



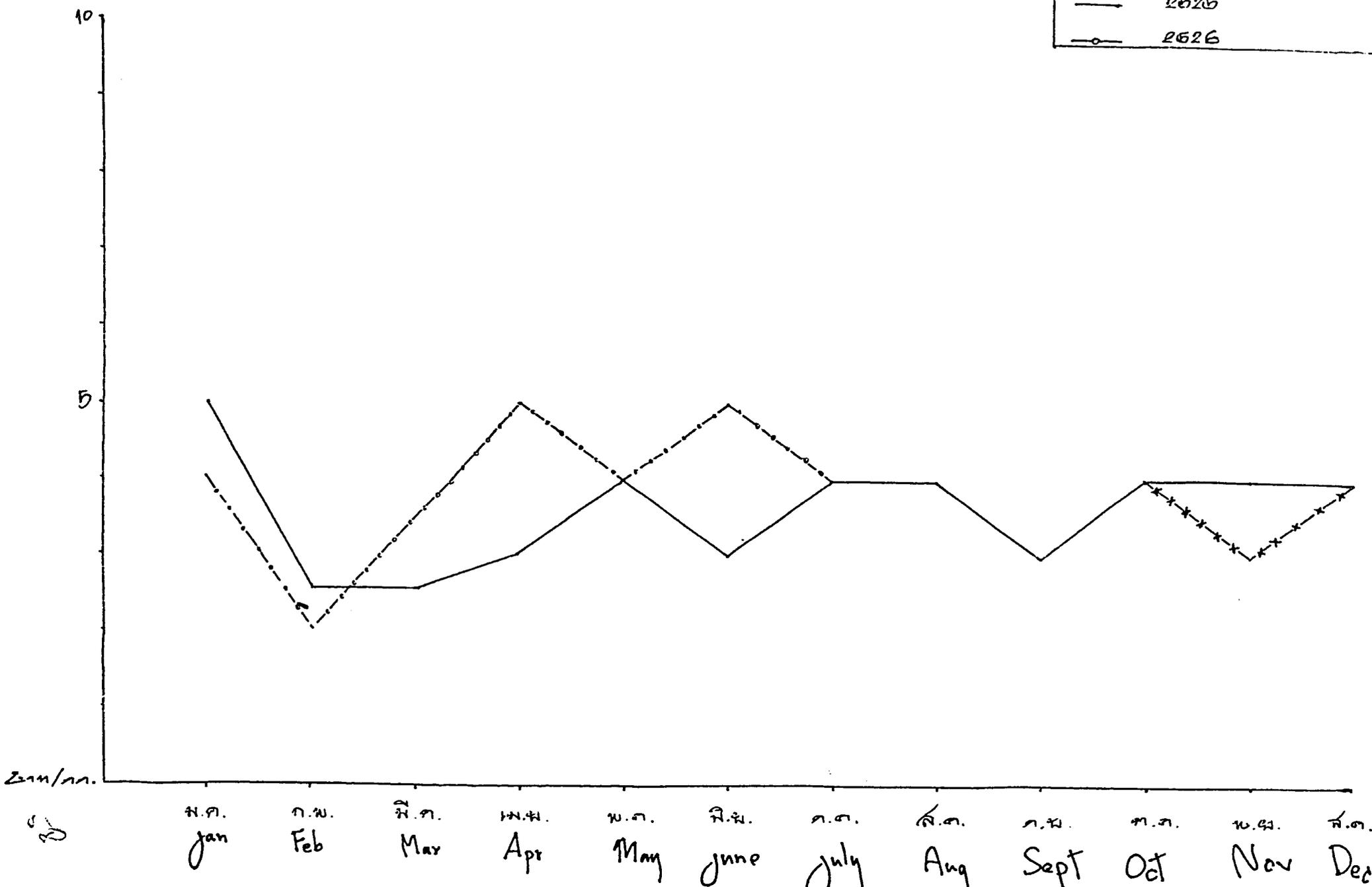
๒๕๒๕ Crop ๒๕๒๖ Kale
 ตลาด. ๒๕๒๕ Sawang Daengin
 MARKET ๒๕๒๖
 —x—
 —
 —o—



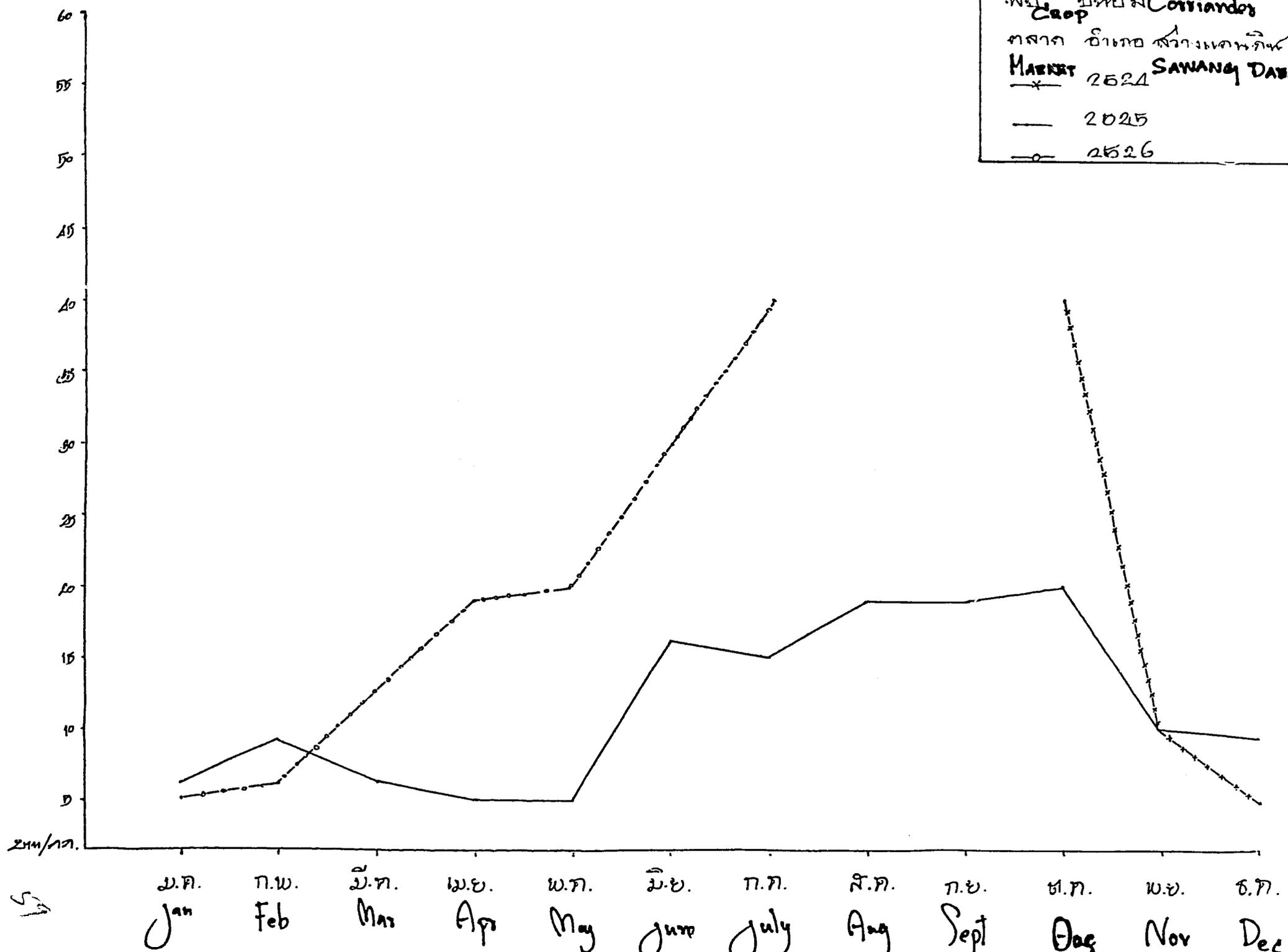
บาท/กก.

๒๕๒๕
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

ไม้ปลูก Dwarf cucumber
 ตลาด ตลาดวังเตาพริก
 MARKET SAWANG DAENGIN
 -x- 2524
 — 2525
 —o— 2526

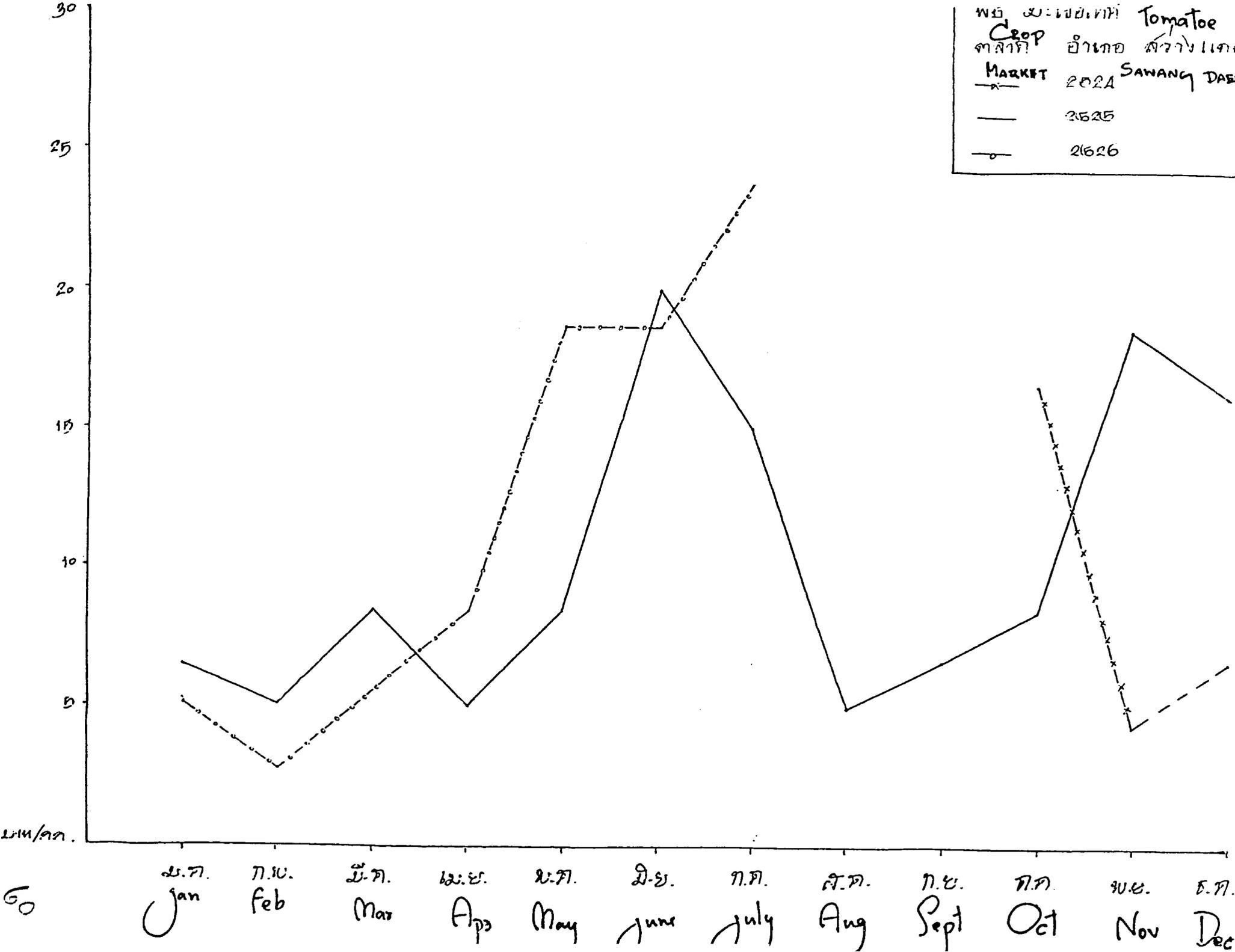


พืช ^{ชื่อ} ผัก Coriander
 ตลาด ^{ชื่อ} ตลาด Sawang Daeng
 MARKET 2524
 — 2025
 —o— 2526

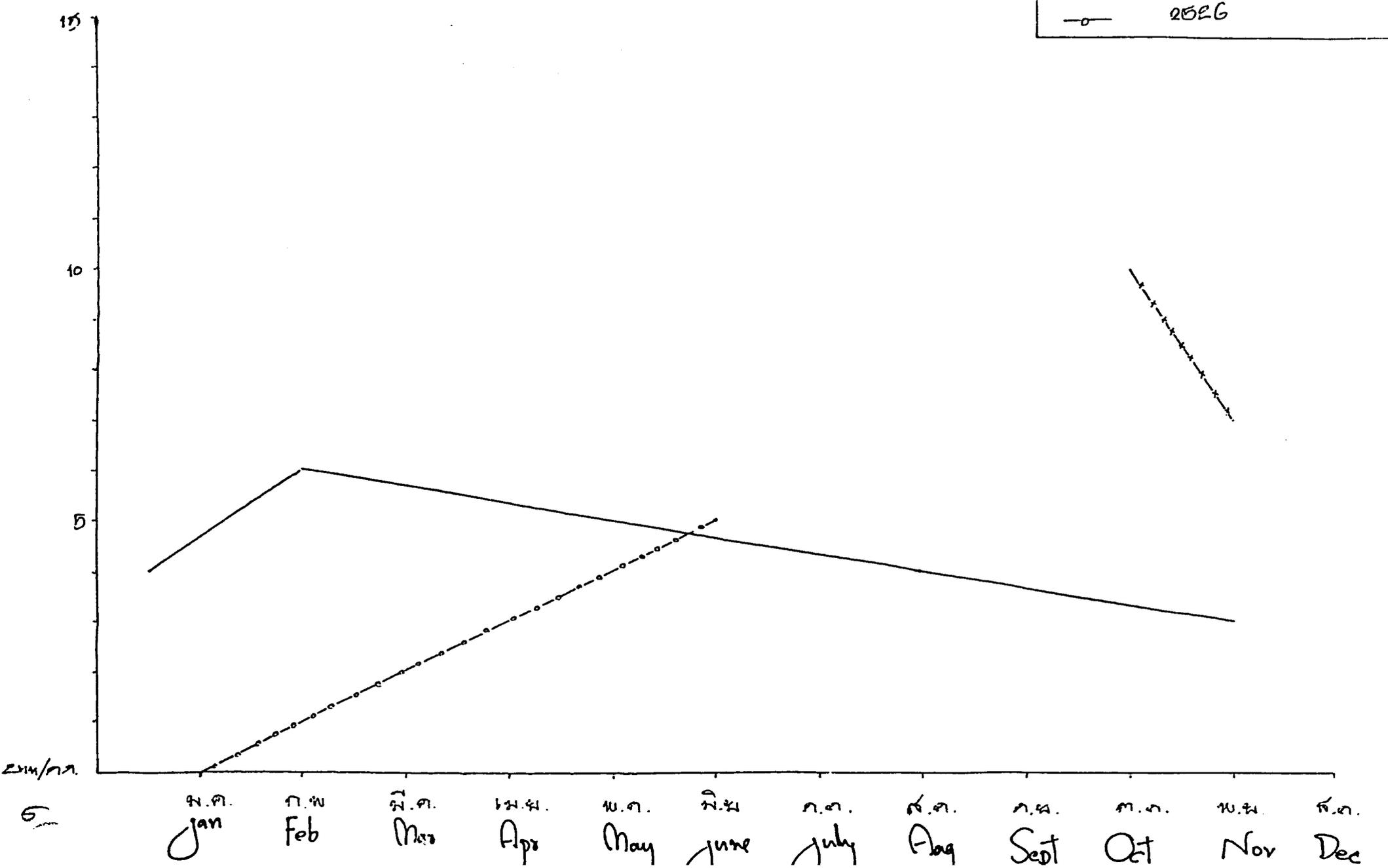


54

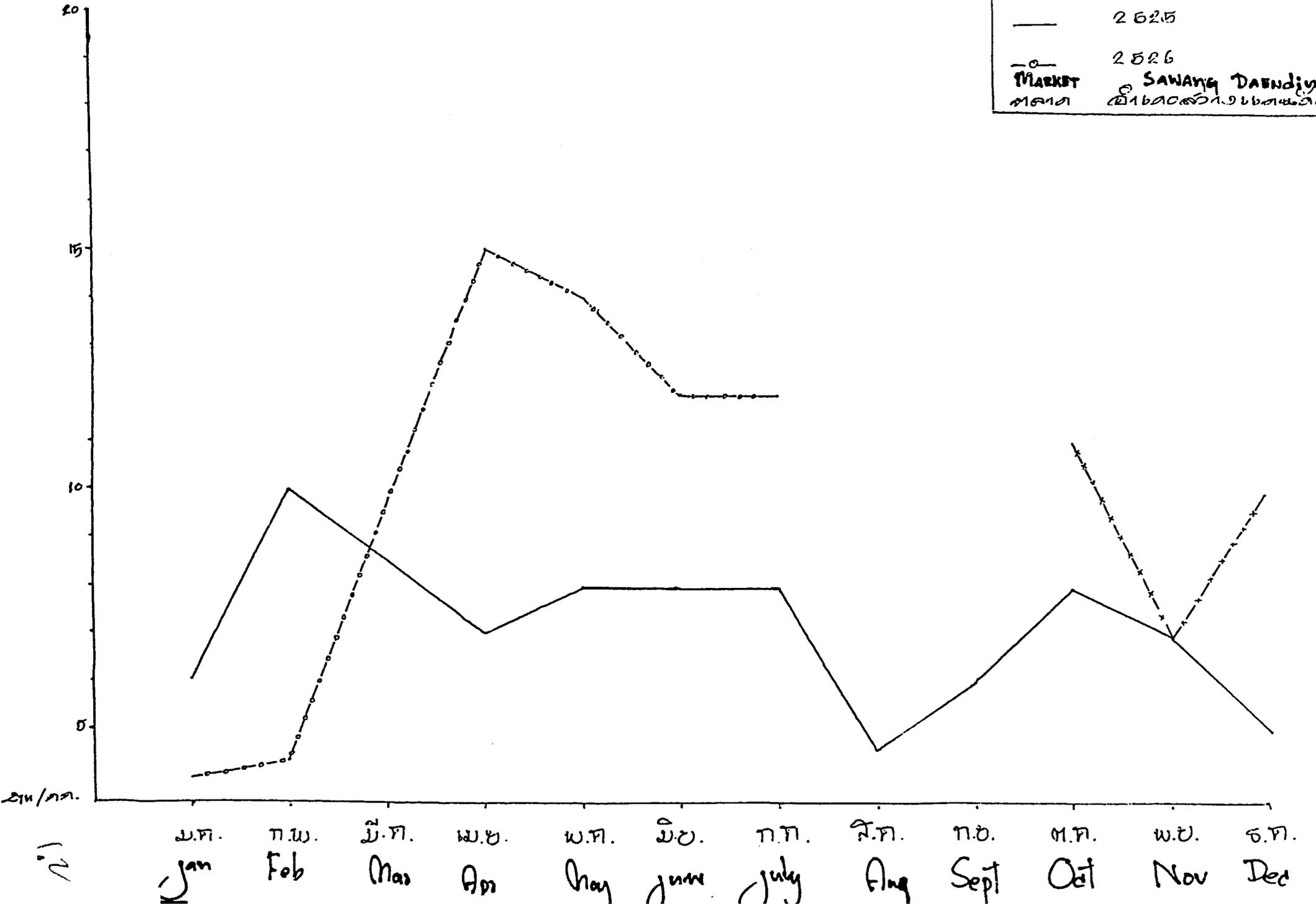
พืช ไม้ผลชนิดอื่น Tomatoe
 ฤดูกาล: มีนาคม สิงหาคม
 MARKET 2024 Sawang Daen Bin
 — 2525
 -o- 21626



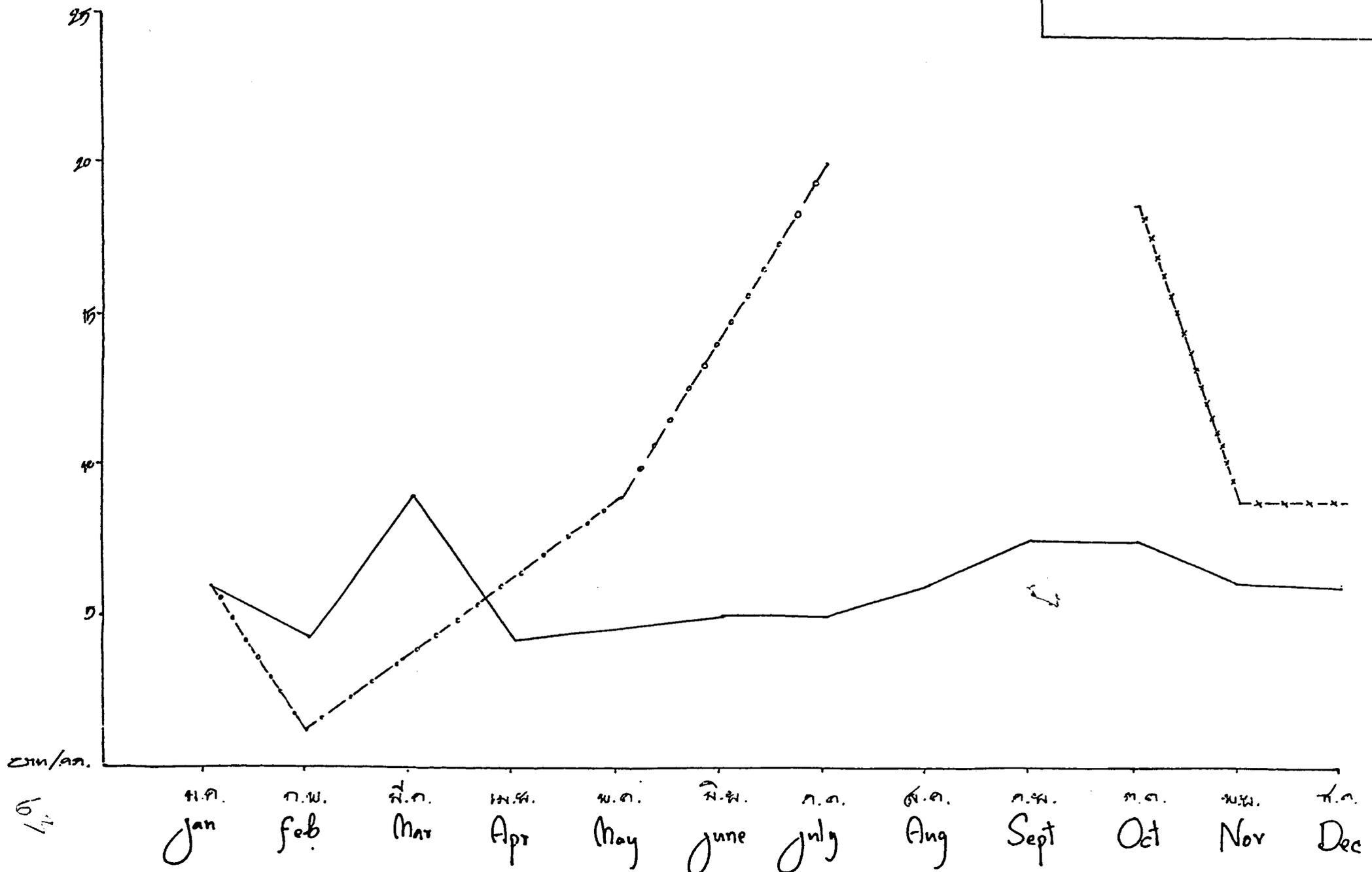
ชื่อพืช พืชที่ปลูก
 Crop Green Mustard
 ตลาด ตลาดสดเทศบาลเมือง
 MARKET 2524 SAWANG DAENDIM
 — 2525
 —o— 2526



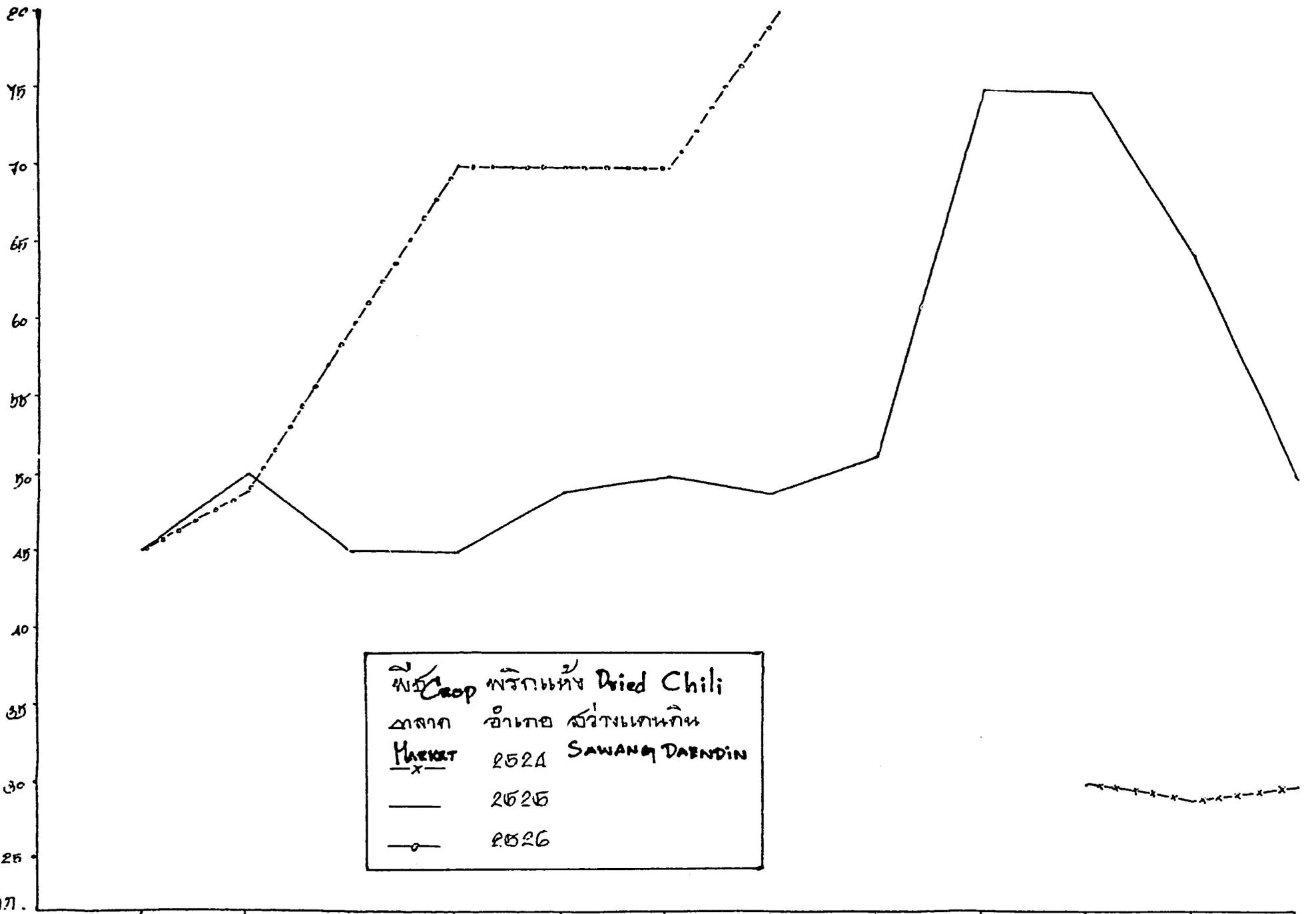
2524 Chinese Cabbage
 2525
 2526
 MARKET SAWANG DAENDIY
 ตลาด Sawang Daendiy



2024 CROP
 2025
 2026
 MARKET
 2024
 2025
 2026
 SANGANG DAENDIM



10/1

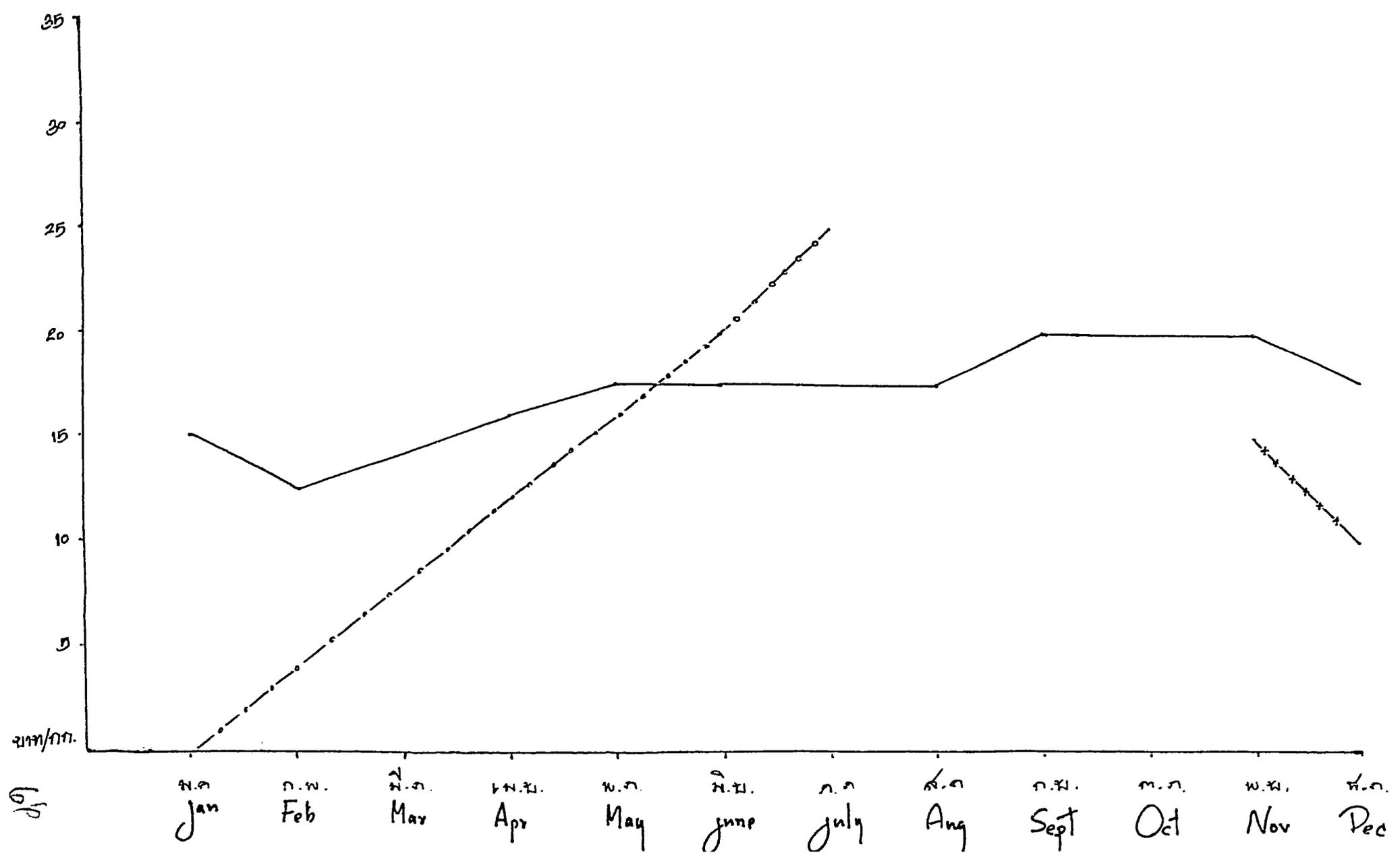


ผลิตโดย ปลูกแห้ง Dried Chili
 ตลาด อำเภอ สว่างแดนดิน
 MARKET 2524 SAWANG DAENDIN
 — 2525
 —○— 2526

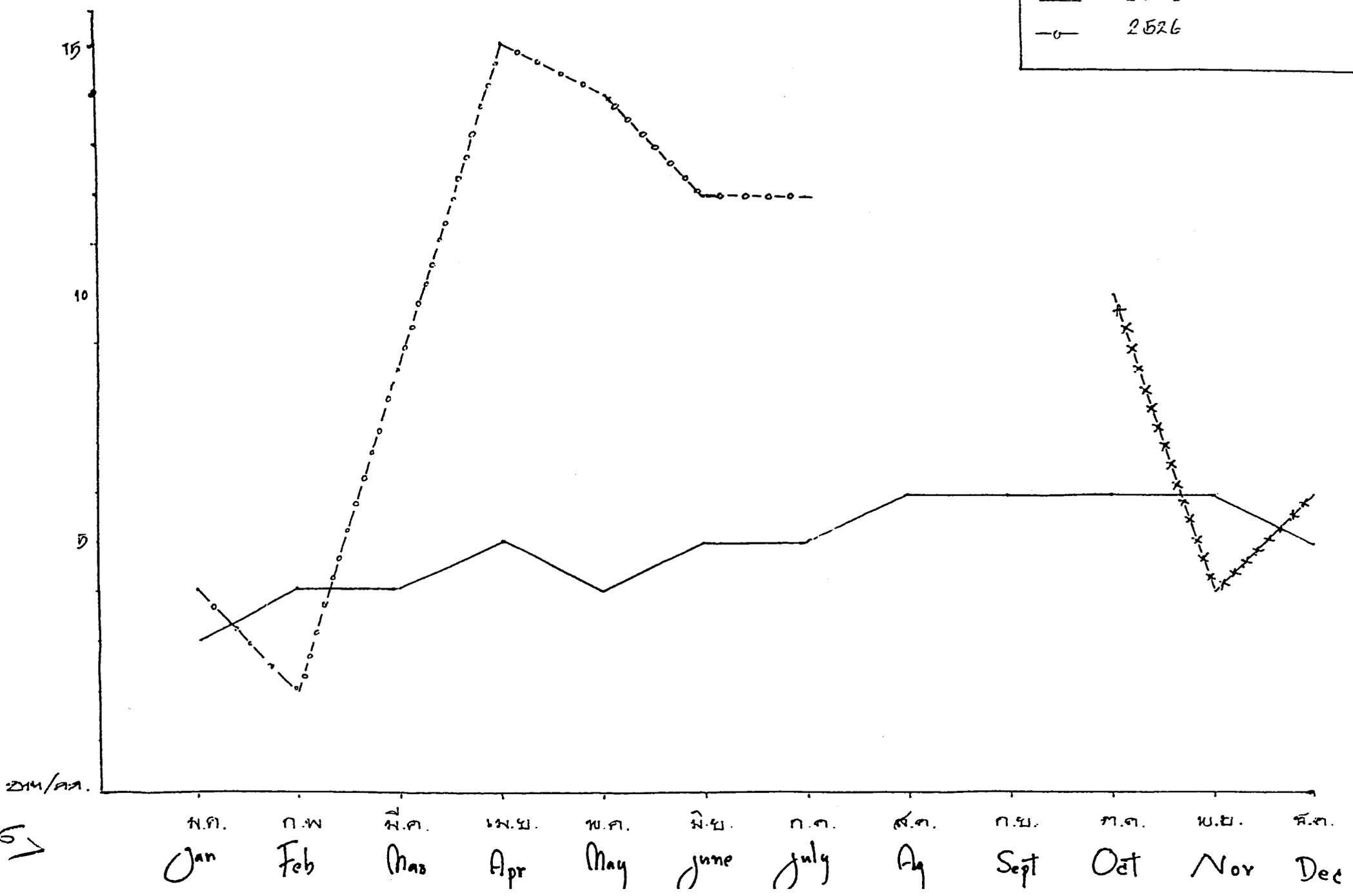
บาท/กก.

จ.พ. ก.พ. มี.พ. เม.ย. พ.พ. มิ.ย. ก.ค. ส.ค. ก.ย. ต.ค. พ.ย. ธ.พ.
 Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

15: 111002 Cauliflower
 Crop
 111002 Sawang Daeng
 MARKET
 -x- 2524
 — 2525
 -o- 2526

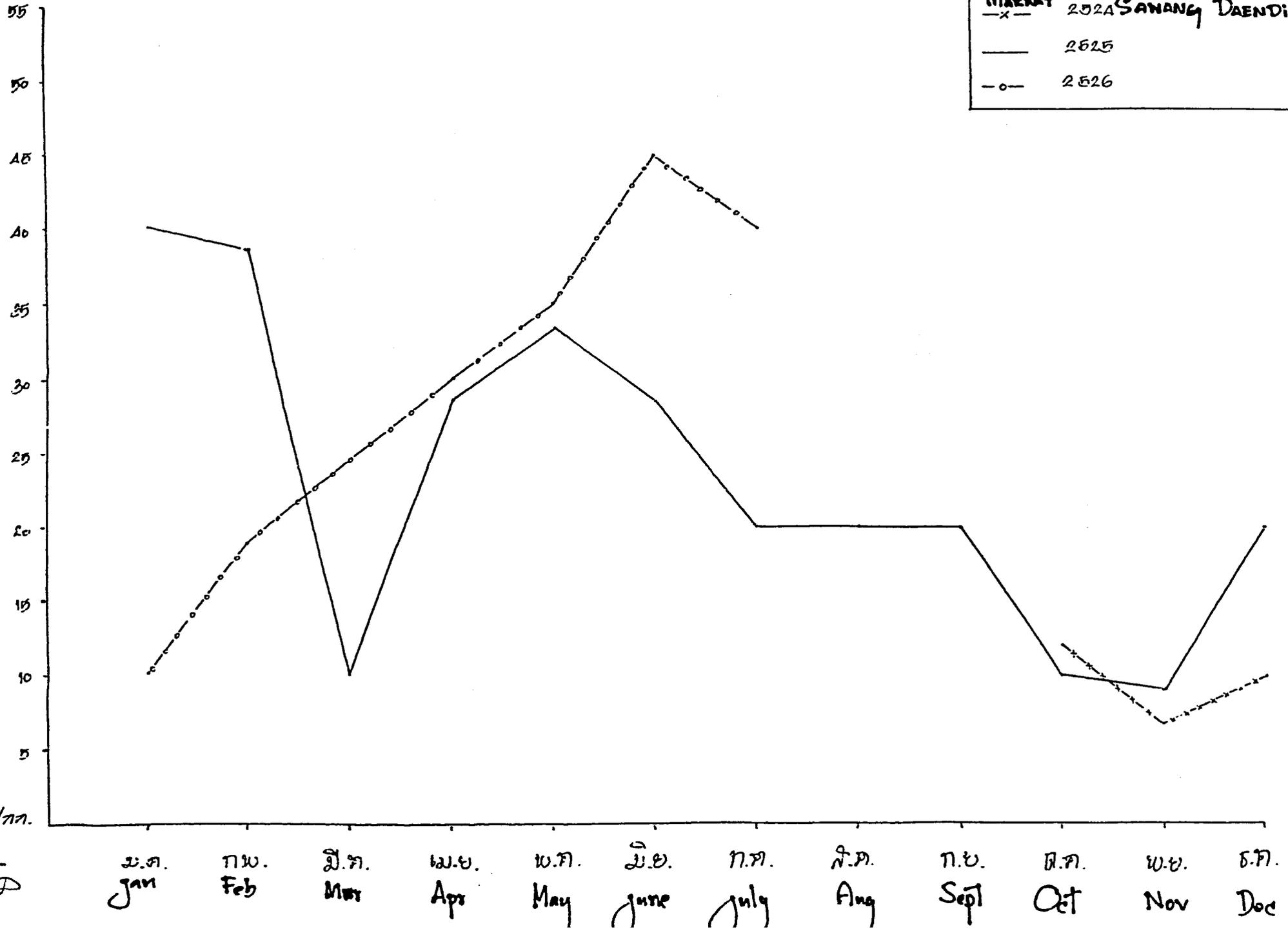


ปี 25 Crop ปี 25 ผลิต Cabbage
 ตลาด ตลาด Sawang Daengdin
 Market 2524 Sawang Daengdin
 — 2525
 -o- 2526



6

ไร่ ^{Coop} พันธุ์ Chili
 ตลาด อำเภอ ลำปางเหนือ
 MARKET 2024 SANANG DAENDIN
 — 2525
 -o- 2526



AUTHOR

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Project Note No. 5: "Pilot Area 2 - Operations Research Result - 1981/82 - Lam Nam Oon", September, 1982. Co-Authored with William C. Bell

Project Note No. 8: "Operations Research Results - Agro-Economics - 1982/83 Dry Season Lam Nam Oon Integrated Rural Development Project" July, 1983.

Agro-Industrial Investment Opportunity Report "Groundnuts" - Lam Nam Oon, September, 1982.

Several additional reports and studies by Mr. Zola concerning Lam Nam Oon are about to be published.