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ECONOMIC SURVEY
OF
JANAKPUR ZONE
IN
NEPAL

December, 1973

OVERSEAS TECHNICAL
CORPORATION AGENCY



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P R E F A C E

Janakpur Agricultural Development Project is now in progress under the cooperation of Nepal and Japan. Nevertheless the basic research of transportation and circulation has not been operated in order to extend the cooperation in the whole area of Janakpur Zone around the Project Centre in Tarai for the future. This report is intended to propose some of the measures necessary for the development and it is anticipated that the proposed measures will be enforced as much as possible through the future design of the proposal in details.

Most of the data we have were gathered by us from the field survey interviewing farmers. We use the data offered by Ministry of food and Agriculture, Ministry of Industry and Commerce, Ministry of Finance, Central Bureau of Statistics, Land Reform Ministry and Nepal Rastra Bank as supplementary materials.

We appreciate the kind and great cooperation given to us by the staff of Janakpur Agricultural Development Project at the survey.

1. INTRODUCTION

We made a field survey on agriculture, market and road impact mostly at Sarlahi District and Dhanusha District for 45 days from the 9th of May to the 23rd of June 1973. In order to plan the wide range of agricultural development in the whole Janakpur Zone, we have surveyed not only in the regions of Tarai Plain but also in Sindhuli District of Inner Tarai, Ramechhap of Hill Area and Dolakha District. Although we could not survey the sufficient numbers of samples because of the lack of Transportation facilities and the survey period being only just before cultivation season of rice, we believe, we could propose the alternative plans for the significant policies with the high priority in this report.

Conclusion is divided into two parts. One is made stress on hardware -- design of structural objects. The other is on software -- organization, education and training. In order to proceed Janakpur Agricultural Development Project now in progress more effectively, it would be necessary to take the proposed alternative plans for execution. We hope the alternative plans described in this report shall be extensively used as a model of the regional development plan for the Zones in Nepal.

2. OBJECTIVES

- 1) To analyse regional differences in development and inter-regional relationships of Janakpur Zone and its hinterland.
- 2) To propose alternatives for development schemes so that Janakpur would succeed as a model in agricultural innovation in Nepal.

3. METHOD OF APPROACH

- 1) To conduct a field survey on the present aspects of production, trade, transport, market and consumption.
- 2) To divide Janakpur Zone into three regions, taking into consideration natural and economic condition.

A. Hill Area

Hill area between Tibet and Mahabharat Range.

(Dolakha District, Ramechhap District)

B. Inner Tarai

Hill area between Mahabharat Range and Siwalik Hills.

(Sindhuli District)

C. Tarai

Plain area between Siwalik Hills and the Indian border.

(Dhanusha District, Mahotari District, Sarlahi District)

For purposes of analysis, Sarlahi District is divided into regions as follows:

- a. Northern region: area along the East-West Highway.
 - b. Middle region: : area between the East-West Highway and the Indian border.
 - c. Southern region : area along the Indian border.
- 3) To bring up problems encountered in each classified area in the face of regional agricultural development for Janakpur Zone.
 - 4) To propose alternatives for the regional development plan.

4. FIELD SURVEY (Fig. 4-1)

4-1. Field survey items and locations

Item Distric	Village Survey	Market Survey	Road Impact Study
Dolakha		1. Jiri	
Ramechhap		Ramechhap	
Sindhuli		1. Sindhulimahri	
Danusha		1. Sakhuwa 2. Janakpur 3. Matihani	
Mahotari		1. Jaleswar	
Sarlahi	1. Harion 2. Pharahaduwa 3. Ishwarpur 4. Malangwa 5. Bishnupur	1. Raniganj 2. Harion 3. Hatiesar Harpur 4. Barahathawa 5. Mahendra 6. Baharsar 7. Sunderpur 8. Malangwa 9. Tribhuwan	1. Harion

4-2. Sampling

1) Village survey (Sarlahi District)

Northern region : 5 farmers in Harion Panchayat

Middle region : 8 farmers in Pharahaduwa and Ishwarpur Panchayat

Southern region : 3 farmers in Malangwa and Bishnupur Panchayat

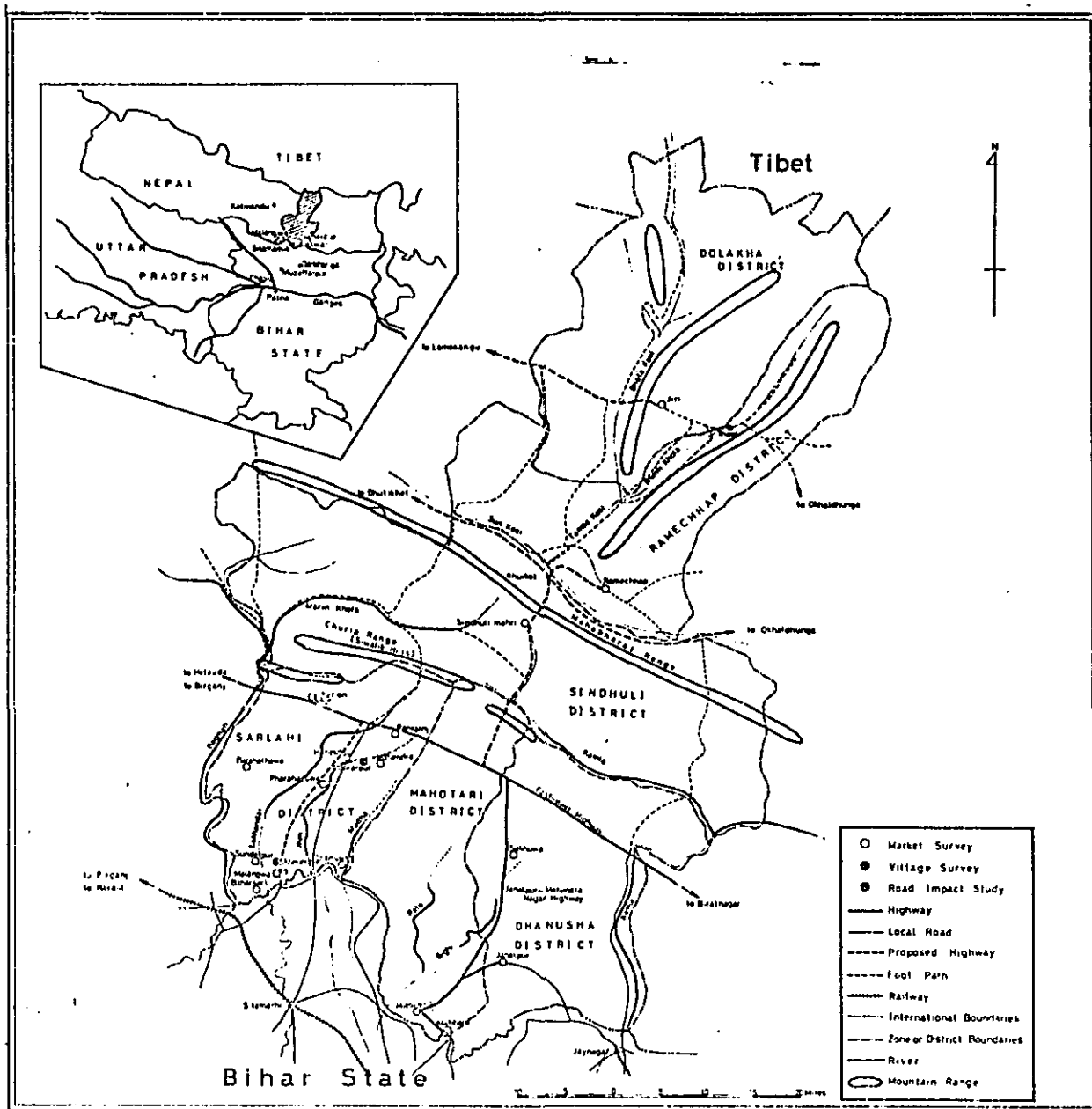
2) Market survey

Item Sample	Origin - Destination	Market Price
Commodities	68 kind of commodities (Shown in Table 4-1)	1. Monthly fluctuation of market price of main agricultural products (10 spieces) 2. Other 58 commodities : priceas of May 1973)
Sellers	Chose one seller at random per each commodity and asked the location of produc tion, purchase and residence	/
Purchasers	Chose 10% of the total purchasers in each market and asked the location of trade and residence	/

Table 4-1 List of Commodities

	Classification	Name of Commodity	
	Cereal Grains, etc.	1. Thick rice 2. Thin rice 3. Bitter rice 4. Maize 5. Wheat 6. Millet 7. Arahara (Pulse) 8. Kesari (Pulse) 9. Motar (Pulse)	
Farm Products	Vegetables, etc.	1. Potato 2. Onion 3. Ladies finger 4. Tomato 5. Raddish 6. Gourd 7. Egg-Plant 8. Cucumber 9. Ginger 10. Raw chili 11. Dried chili 12. Mustard 13. Garlic	
	Fruits	1. Banana 2. Mango 3. Papaya	
	Industrial Crops	1. Leaf tobacco 2. Sugercane	
	Meat, Fish and Dairy Goods	1. Dhahi (a king of yogurt) 2. Milk 3. Fresh egg 4. Mutton 5. Chickin 6. Fish	
Processed Products	Agricultural Nature	1. Suger 2. Tea 3. Salt 4. Mustard oil 5. Cigarette 6. Biri (a king of tabacco) 7. Biscuit	
	Industrial Nature	Basic Goods	1. Kerosene oil 2. Match 3. Soap 4. Towel 5. Alminium bowl 6. Sandals 7. Lock and key 8. Pencil 9. Ink 10. Fountainpen 11. Tooth-brush 12. Tooth-paste
		Luxury Items	1. Shoes 2. Mirror 3. Earring 4. Leather band 5. Sari 6. Penicilin 7. Shirt

Fig. 4-1 Field Survey of Janakpur Zone



3) Road impact study

Select 20 farmers at random in Harion panchayat along the East-West Highway.

5. CONCLUSION

1) Outstanding problems

- (1) Stabilization of the price of Agricultural products.
- (2) Maintenance of sufficient quantities of food.
- (3) Acquisition of income resources other than rice cultivation.
- (4) To secure resources to finance the budget for the area development.
- (5) Expansion of trading area and promotion of a domestic market.
- (6) To supply the surplus rice from Tarai plain area to Hill Area.
- (7) To develop the new transportation system for economizing transportation cost.
- (8) To increase the inhabitants income.
- (9) Improvement of health condition of the inhabitants.

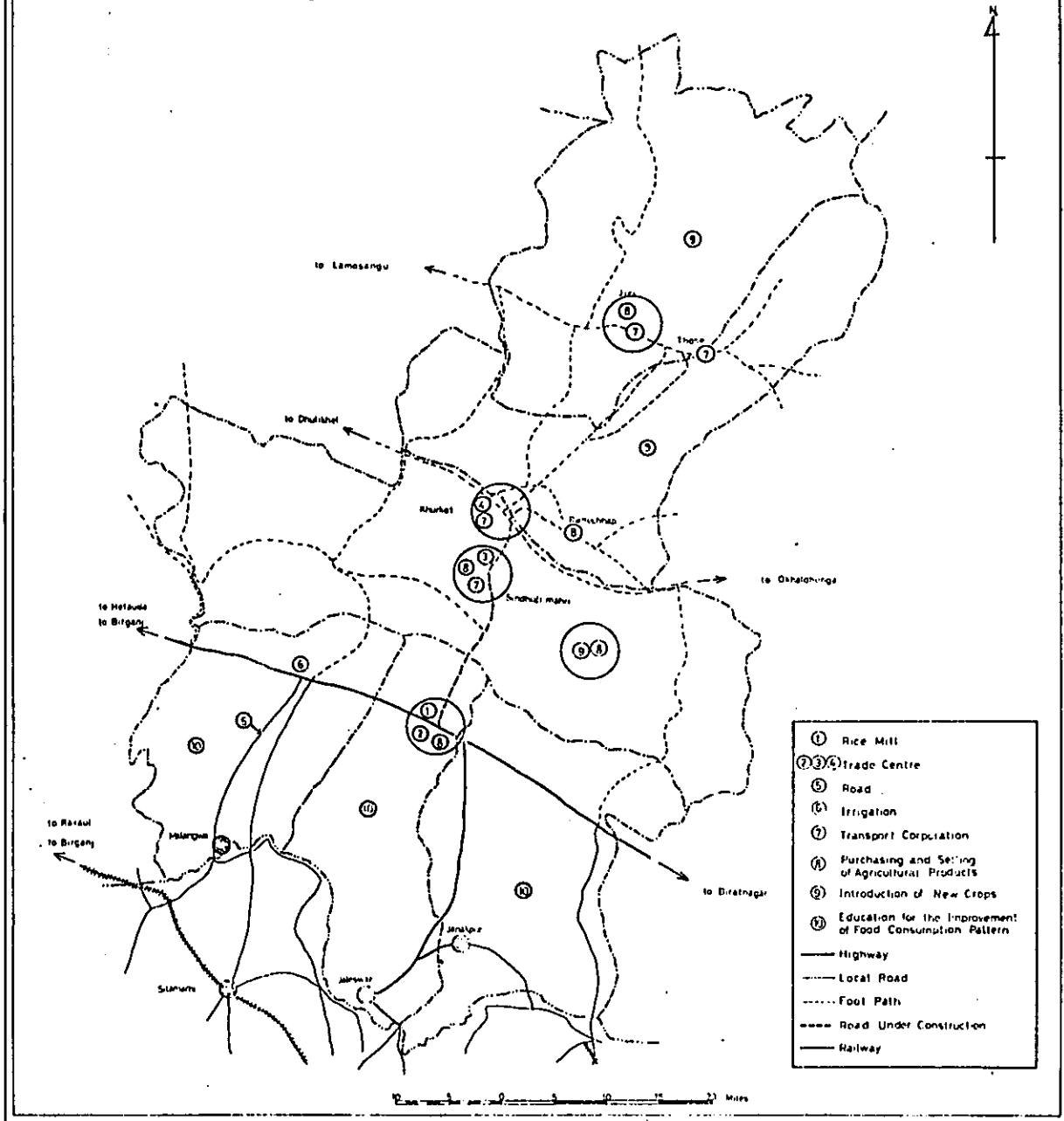
2) Alternative plans

The above-mentioned problems will be solved by the implementation of the plan, as shown in table 5-1 and Fig. 5-1.

Plan	Function															Alternative Location		No. on the chart
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Area	Spot	
Hardware Sector										o	o	o	o	o	o	Tarai	Junction of the East-West Highway and the road leading to Sindhu(mahri)	1
		o	o							o	o	o	o	o	o	Tarai	Ditto	2
			o	o						o	o	o	o	o	o	Inner Tarai	Sindhu(mahri)	3
				o	o					o	o	o	o	o	o	Hill Area	Khurkot	4
		o				o	o	o	o			o	o	o	o	Tarai	The North-South Road in Sariahi District	5
		o										o	o	o	o	Tarai	Along the East-West Highway in Sariahi District	6
																1. Inner Tarai 2. Hill Area	Sindhu(mahri), Jiri Khurkot, Those	7
				o												1. Tarai 2. Inner Tarai 3. Hill Area	At least one organization in each district	8
																1. Inner Tarai 2. Hill Area	Sindhu(mahri), Ramechhap and Dolakha District	9
																Tarai	Dhanusha, Mahodari and Sariahi District	10

1. Increase of agricultural production
2. Collection of paddy or rice
3. Storage of paddy or rice
4. Transit of paddy or rice
5. Distribution of paddy and rice
6. Bulk transportation
7. Transportation in time
8. Economization of transportation cost
9. Expansion of trading area
10. Stabilization of price agricultural products
11. Protection of food drains to foreign countries
12. Maintenance of sufficient quantities of food
13. Acquisition of income resources other than rice cultivation
14. To secure resources to finance the budget for the area development
15. Improvement of health condition of the inhabitants

Fig. 5-1 Janakpur Zone with Alternative Locations of Production, Trade, Transportation and Consumption



6. SUMMARY

6-1. Distribution of Agricultural Products

Sarlahi District, which is the largest of the 3 Districts in Janakpur zone on the Tarai plain, has only 35% (48,600ha) of its area under cultivation. Comparatively, in Mahotari District, 77% (95,800ha) of its total area of 125,000ha is under cultivation. And in Dhanusha District, approximately 84% (100,200ha) of a total area of 119,000ha is under cultivation. Therefore, the percentage of cultivated area in Sarlahi District proportionates to 50% of that in Mahotari District and 40% of that in Dhanusha District.

Sarlahi District not only occupies the small percentage of land under cultivation but also is inferior to the other regions in irrigation facilities. According to the data published by the National planning Commission in 1967-68, the irrigated area in Sarlahi District amounted merely to 1,199ha or 1/8 of the irrigated land total of 9,553ha in Mahotari and Dhanusha District.

Annual paddy yield (1970-71) in Sarlahi District is 71,700tons, in Mahotari District 113,400tons, and in Dhanusha District 108,000tons.

As for sugarcane and tobacco which are important cash crops, production sites are closely related to transportation facilities and factory location. With the sugar factory of Birganj near by, Sarlahi District, therefore, becomes the largest sugarcane producing belt (1,500tons produced in 1970-71) in Janakpur. While Dhanusha District (where the Janakpur Cigarettee Factory is located) and Mahotari District produce 1,760tons and 1,860tons of tobacco correspondingly. However, following the opening of the East-West Highway to the public, transport conditions improved for the three Districts, which in turn are expected to improve the distribution pattern of crop cultivation.

Results (Fig. 6-1), from analysis of Sarlahi District with the three aspects of natural condition, physical infrastructure, its

consolidation and its influence on the introduction of new crops, are as follows :

- 1) Northern region :
 - a) Water condition is poor,
 - b) Main crop : maize
- 2) Central region :
 - a) Water condition is good.
 - b) Main crop : paddy
 - c) Regardless of poor road condition, various types of crops have been introduced e. g. sugarcane and tobacco.
 - d) With a branch of the Janakpur Cigarettee Factory near the Mahendra market in its hinterland, development of the tobacco industry made much progress and should accelerate upon reinforcement of the main road that runs north to south through Sarlahi District.
- 3) Southern region :
 - a) Water condition is average in comparison with the two regions above.
 - b) Main crops : paddy and wheat

In the north, the production pattern has shown a noticeable transformation owing to the East-West Highway (Introduction of sugarcane and tobacco as stated in "6-5 the Road impact study of the East-West Highway".) When the water condition is improved, much more progress will be made.

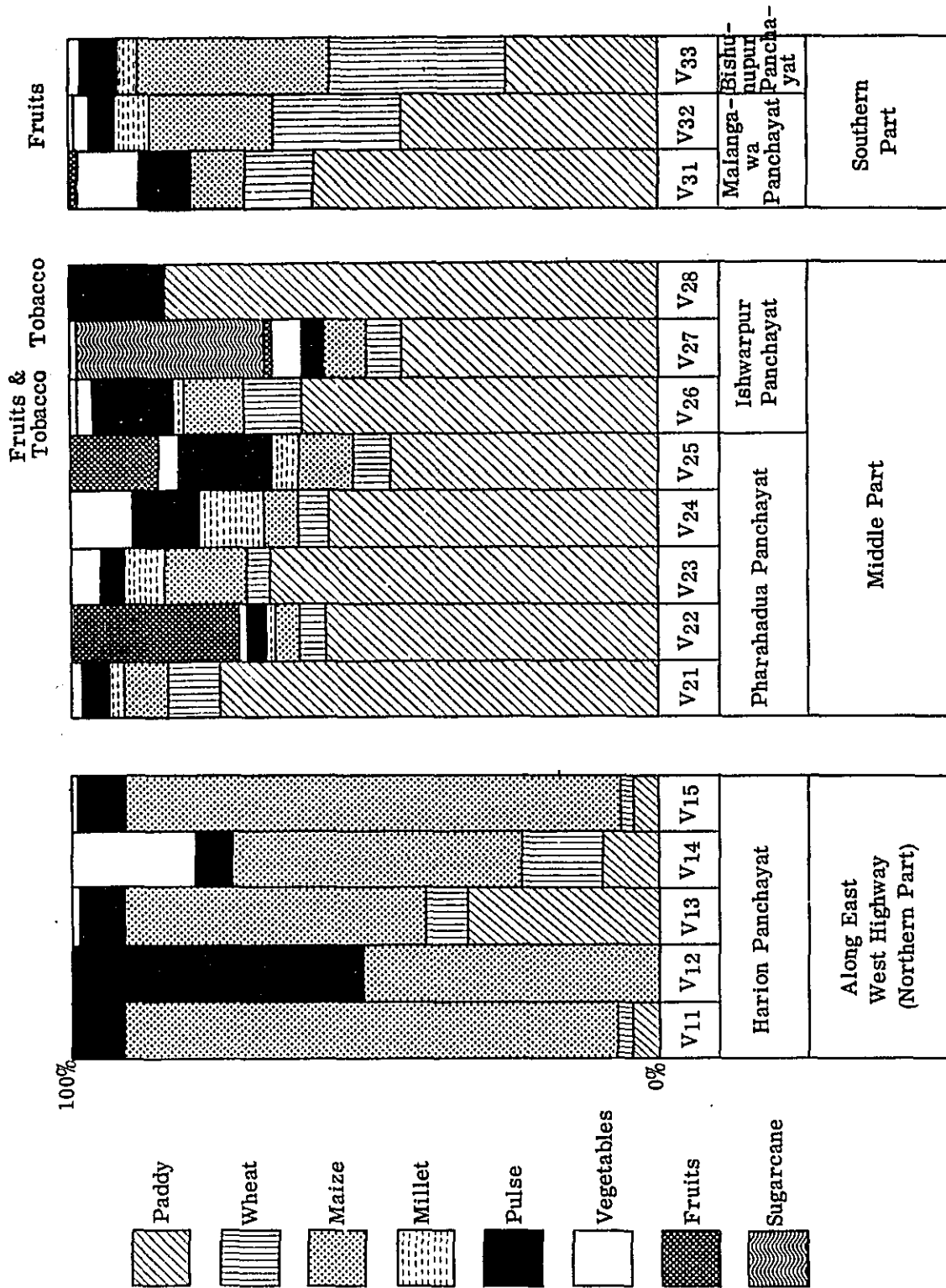


Fig. 6-1 Agricultural Production by Crops and Villagers (1972)
(Excluding Meat and Fish)

6-2. Consumption Pattern

Assuming that Sarlahi District is the representative region for the consumption pattern (particularly food) in Tarai, east Nepal, we raise the following problems which need solutions, regarding consumption in east Tarai.

1) Unbalanced Diet

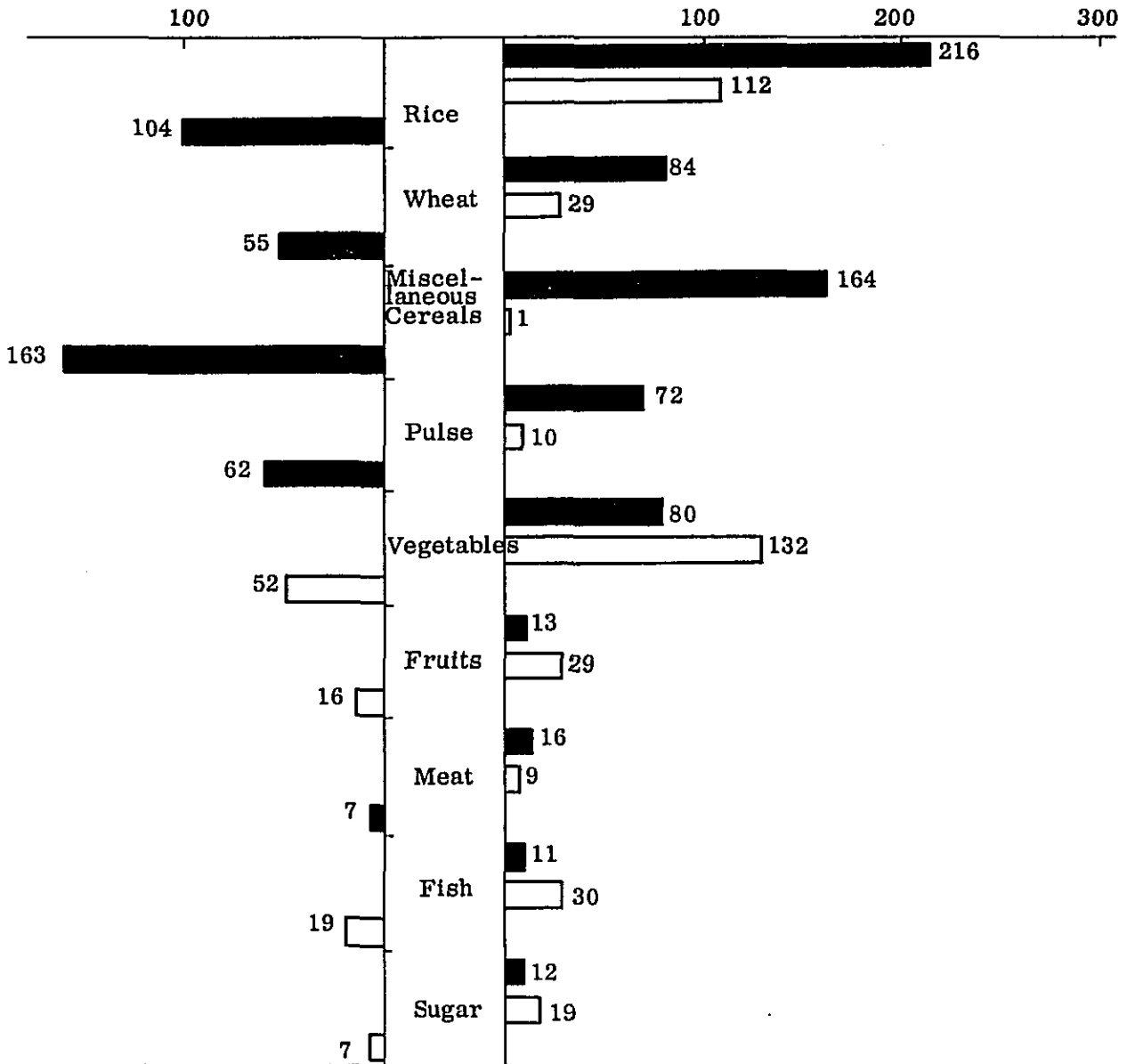
Apart from different living conditions, the quality and quantity of labour, the trend in diets is shown in Fig. 6-2, taking the average Japanese consumption pattern as the norm. The Sarlahi inhabitants consume far more cereals (rice, wheat and miscellaneous grains) than the Japanese (consumption of rice is 1.9 times higher and the total grain consumption is 3.2 times higher than Japanese statistics). The Japanese, however, consume more vegetables and fruits (161kg/year) than the Sarlahi inhabitants (93kg/year).

Meat-wise, the Sarlahi inhabitants have a higher consumption record. But as far as animal protein is concerned, the fish-eating Japanese has a higher record of 68kg/year compared to the 40kg/year consumed by the Sarlahi inhabitants respectively.

The important issues here, however, are to initially promote better health through improved diet patterns. And secondly, to control the consumption of main cereal grains such as rice and wheat in order that the food supply be in proportion to population growth (at present the population growth rate averages 2% per year).

Fig. 6-2 Comparison of Quantity of Annual Food Consumption between the Inhabitants of Sarlahi District and the Japanese

Difference of food consumption between the inhabitants of Sarlahi District and the Japanese



■ Quantity of annual Food consumption of the inhabitants (1973)

□ Quantity of annual Food consumption of the Japanese (1965)

Source of Data

The data of quantity of annual food consumption of the Japanese were subtracted from "Japan Statistical Year Book 1971" Bureau of Statistics, Office of the Prime Minister

2) Requirements

The demand for fruits is the greatest. It is anticipated that the demand will eventually be 1.4 times greater than the present. Furthermore, subsidiary foodstuffs such as tea, sugar, meat and fish are also strongly in demand. As for rice, there is also considerable demand in spite of the fact that the Sarlahi inhabitants already consume 1.9 times more rice than their Japanese counterparts. This is due to the fact that many people wish to substitute rice for wheat and maize. Hence, the demand for wheat and maize is less than present consumption. Although the extreme lack of vegetable consumption in contrast to Japan, the demand for vegetable is still very little. In order to correct diet pattern imbalance therefore, proper education is needed, together with time--so that the people can reform their beliefs and habits.

3) Regional Differences

In the North, cereals are chiefly consumed, with maize being the most popular grain. As the road has been opened only recently, the effects toward education by the social investment has not revealed yet. However, much expense on industrial products and festivals indicates the expansion of local activities and trade—propelled by the East-West Highway.

In the Middle region, the consumption of cereals is less. Subsidiary foodstuffs, animal protein such as meat and fish are also consumed in lesser quantities. Likewise, less industrial products are purchased. This may be attributed to the poor conditions of roads which in turn limits the flow of commodities (especially when north-south main road gets blocked in the rainy season). In spite of profit being expected large because of high yields in paddy and other agricultural products, the expenditure on industrial products and festivals is small, suggesting a narrow range of economic activities. Should the road conditions be improved, there

will be better advancement for consumption life naturally.

In the South, there is indication of Indian economic and cultural influences with low Engel's coefficient and greater expenditure towards industrial products, festivals and education.

Consumption patterns show clear differences and this may be attributed to poor road conditions.

6-3. Price

1) Tarai Plain and Hill Area

The Janakpur market in the Tarai Plain (in Janakpur Zone) and the Ramechhap market in the Hill Area are in focus here. Price of rice and potatoes are comparatively studied (Data Source 1972 Nepal Rastra Bank).

a) Rice (Fig. 6-3)

No difference in the price fluctuation pattern for both markets is noted. The price is high during the growing season from May to October, and falls during the harvesting period in November and December.

In regards to annual price fluctuations, the biggest price difference is 1.31Rs/kg (3.48Rs/kg in Ramechhap compared with 2.17Rs/kg in Janakpur) in June and July with the lowest registering at 0.61Rs/kg (2.14Rs/kg in Ramechhap compared with 1.53Rs/kg in Janakpur). The narrow price difference between the two regions varies after harvest with the bigger price differences discernible in the growing season—depicting the seriousness of rice shortage for the Hill Area during the latter season. Furthermore, the lowest Janakpur price of 1.53Rs/kg occurs in December/January while the highest price in Ramechhap (3.4Rs/kg) occurs from June through August and September through October, showing 1.95Rs/kg difference with the prices in Ramechhap being 2.3 times higher than that of Janakpur's. Taking this price

difference into consideration, it must be rational to transport rice from the Tarai Plain to the Hill Area (See 6-6 Transportation).

b) Potatoes (Fig. 6-4)

Unlike rice, the price fluctuation pattern for the Tarai and Hill Area is symmetrical. For Ramechhap, the maximum price occurs in December through February (2.99Rs/kg), and falls down to the minimum during the months of March through May, and August through September (1.28Rs/kg). For Janakpur, price is the highest from May through June, and August through September (1.47Rs/kg) and is the lowest from December through April. Therefore, the biggest price difference between the two markets occurs in December through January (3.00Rs/kg for Ramechhap in comparison with 1.00Rs/kg for Janakpur, therefore the price in the Hill Area are three times higher than the price in the plain region. This indicates the feasibility of transporting potatoes from the plain to the hill. When we look at the feasibility of transporting potatoes from the hill region (Ramechhap) to the plain (Janakpur), it does not seem suitable. The biggest price difference is observed in August and September when the price in Ramechhap is 1.28Rs/kg compared with Janakpur being 1.47Rs/kg.

The difference here is only 0.19Rs/kg. Considering the cost of transportation, therefore, feasibility of carrying the potatoes from the hill to the plain is not high.

In regard to seed potatoes though no research data is available for circulation, it is a known fact that they are exported to India. More detailed research on this matter is required.

2) Cornering (Fig. 6-5)

In Janakpur and Tarai Plain, thick rice generally fetches the highest price from April to October (cultivation season) and falls from November through February. In markets in Tarai Plain, e. g. at the Tribhuwan market in Sarlahi District along the Indian border and at the Matihani market in Dhanusha District, the price of rice soars during the harvest season of October, November and December. As seen in a later chapter (OD Survey) of the agricultural product circulation, production largely depends on local characteristics and primary factors like the poor condition of roads. And in areas that has Indian intervention, marketing activities look towards the border region. Judging from these two phenomena, the soaring prices of thick rice in both the Tribhuwan and Matihani markets may be attributed to the pressence of Indian merchants cornering the product market.

6-4. O - D Survey

1) Flow of commodities and people around Tarai market in Janakpur Zone (Fig. 6-6)

Most of the industrial products are brought into this area from Sitamarhi, Muzaffarpur and Dharbhanga Districts in the north part of Bihar state, India. As shown in the Fig. 6-7, Sarlahi District has very close contacts with Sitamarhi and Muzaffarpur Districts and in particular in Sitamarhi District. There is a junction of roads leading to Nepal and of railways running parallel to the border of Nepa, that makes Sitamarhi District being one of the important trade centre in northern Bihar. Judging from the present flow of commodities, potentiality of Sitamarhi District is very high. To change the flow from Tarai Plain towards the inner part of Tarai Plain along the East-West Highway, it is necessary to establish a trade centre along the East-Wast highway where the transportation condition is suitable and to extend the size

of the centre in future large enough to cope with Sitamarhi District. It is also expected to arrange the transportation condition in good order so that the area with high productivity of rice, such as the Middle region of Sarlahi, and the East-West Highway are connected for smooth circulation of products.

The markets, except Harion, have strong localized characteristics in the flow of agricultural products, and form the market areas extending from south to north where the movement around the markets is limited along the East-West Highway.

As this field survey was practiced just before cultivation season of rice. The closer contact with India must be observed if the survey was conducted just after the harvest.

Compared with the frequent circulation of industrial and agricultural goods along north to south, the circulation along east to west is not as frequent. But it is worth paying attention to the extensive movement of Harion as a centre and area along the completed East-West Highway.

2) Inner Tarai (Fig. 6-7)

Looking at the movement in Sindhulimahri market the Circulation of agricultural products is limited only within the area of 10 miles from the market as a centre, while most of the principal industrial products are brought in from Janakpur city and particularly for circulation of salt this market is distinguished as a transit point to Ramechhap. Sugar is directly brought into the bazars of Sindhulimahri from the factory in Birganj and the market is an important supply centre of sugar to Sindhulimahri District.

3) Hill Area (Fig. 6-8)

Rice from Sindhulimahri and mainly iron but no agricultural products from Janakpur city are brought into Ramchhap market.

Jiri market, located in Dolakha District and being different from Ramechhap market, some exchange with Kathmandu is observed and agricultural goods (leaf tobacco) are brought into the market from Janakpur. Although we could not make satisfactory survey on Hill area we believe that it is necessary to enforce a total development plan including agriculture and tourism, considering the advantages of this area with the touring and mountaineering routes connecting Kathmandu, Lamosangu, Jiri and Those.

Fig. 6-3 Price of Rice (1972)

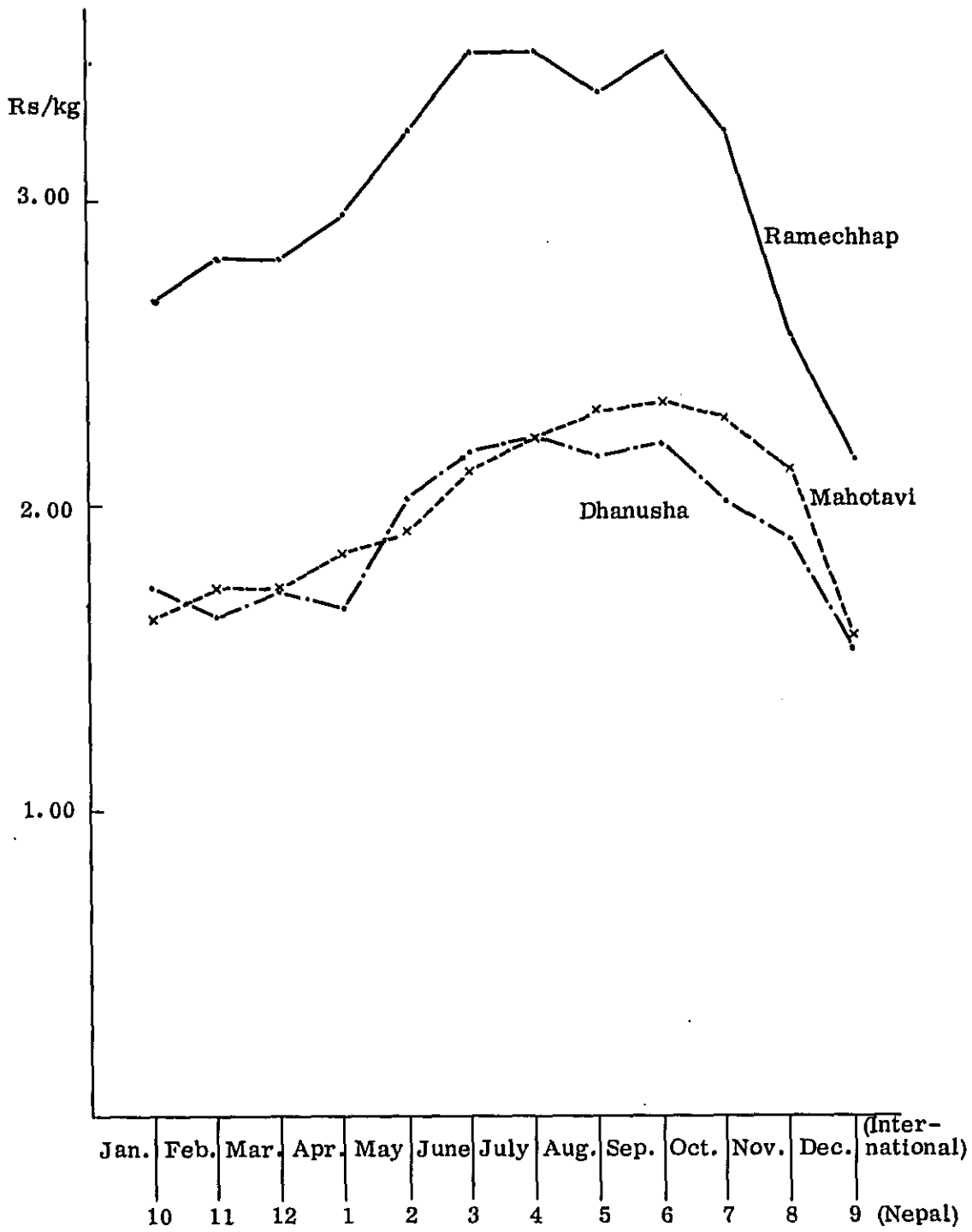


Fig. 6-4 Price of Potato (1972)

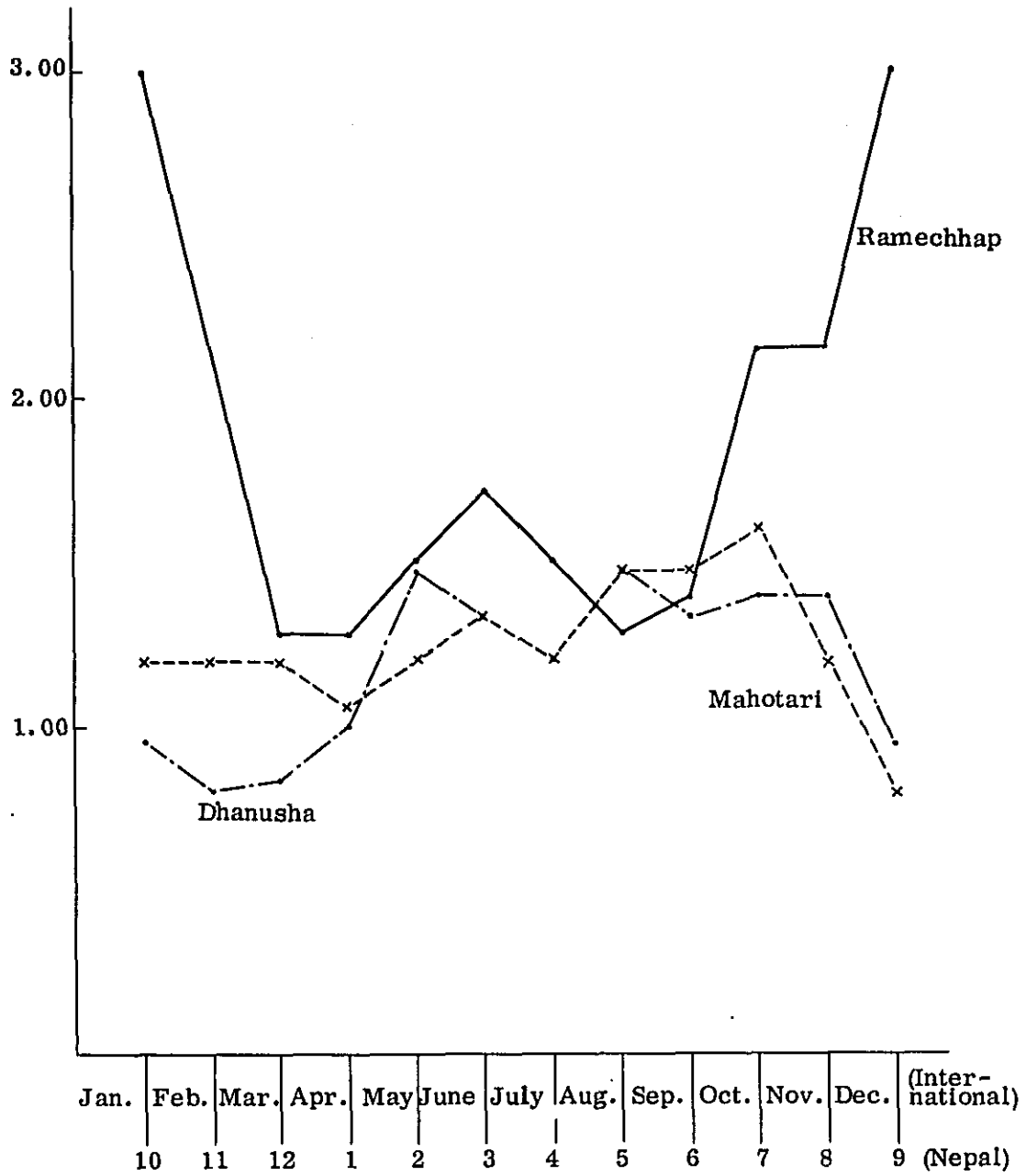
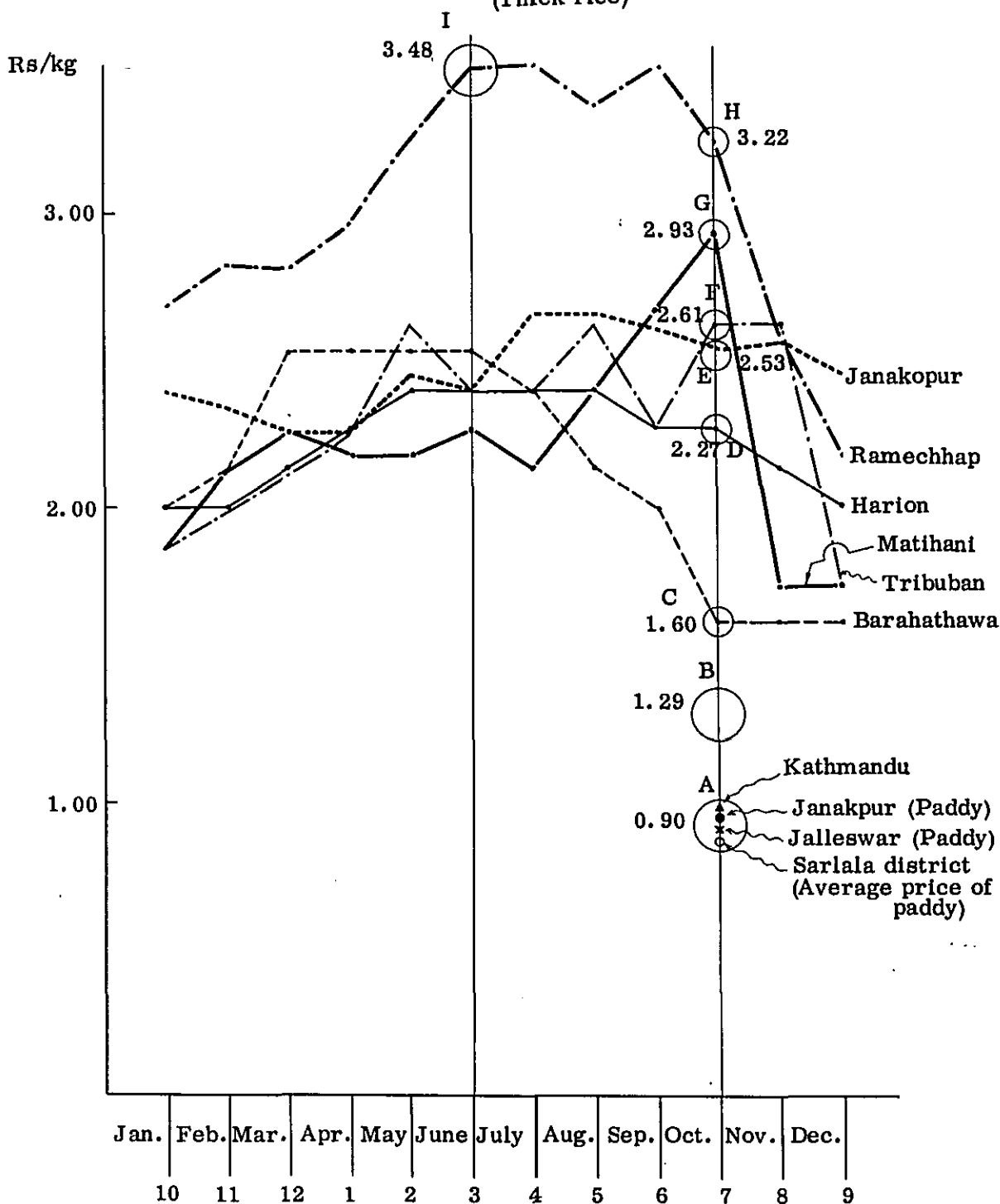


Fig. 6-5 Price of Rice (1972-73)
(Thick rice)



Ramechhap: Data from Nepal Rastra Bank (1972)

Price of Paddy: Price in Janakpur and Jaleswar was subtracted from "Agricultural Marketing Information" Economic Analysis and Planning Division, FAM.

A: Price of Paddy

B: Price of Rice converted from Price of Paddy, A.

Fig. 6-6 O-D Chart (Commodities)

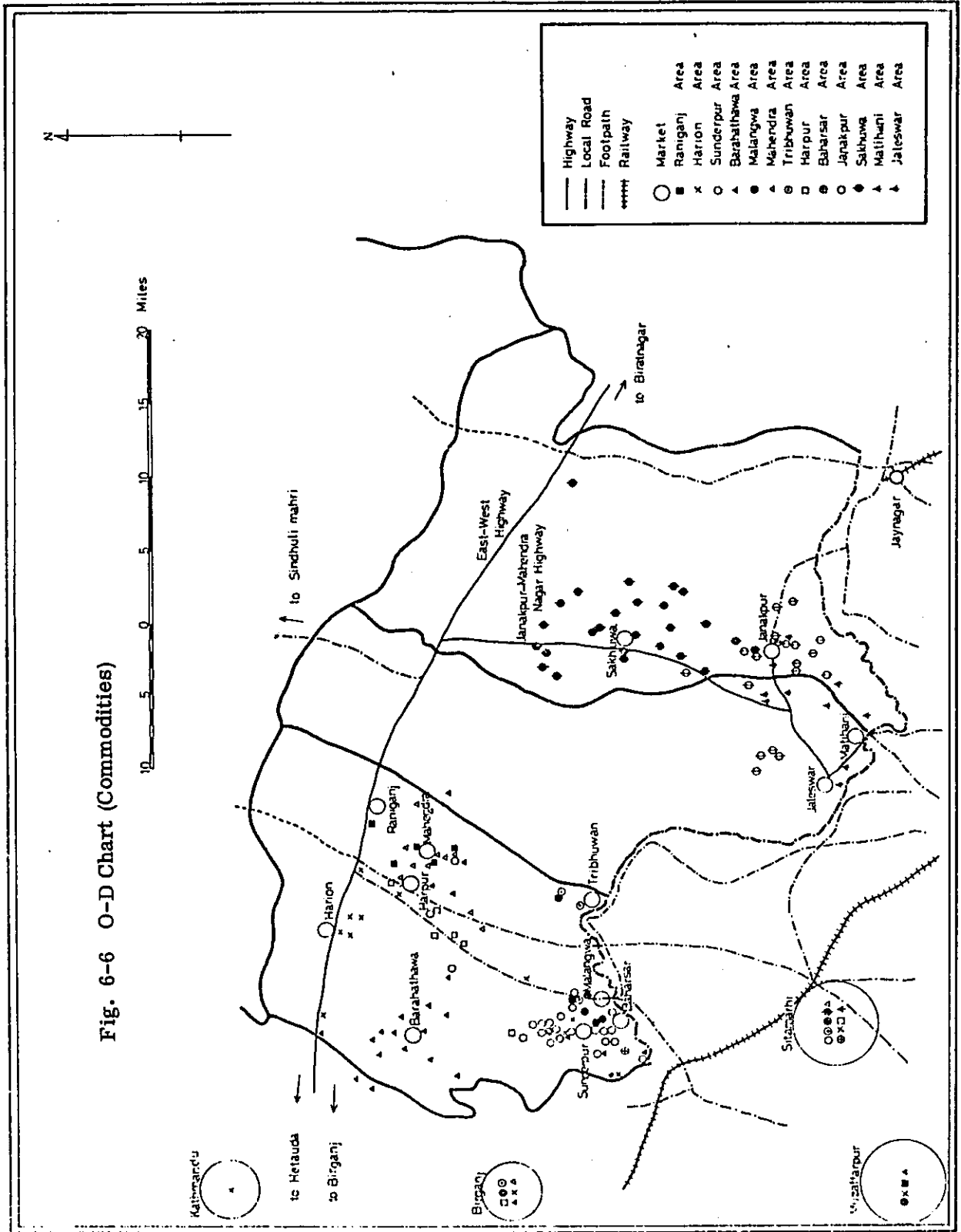


Fig. 6-7 Sindhuli Market

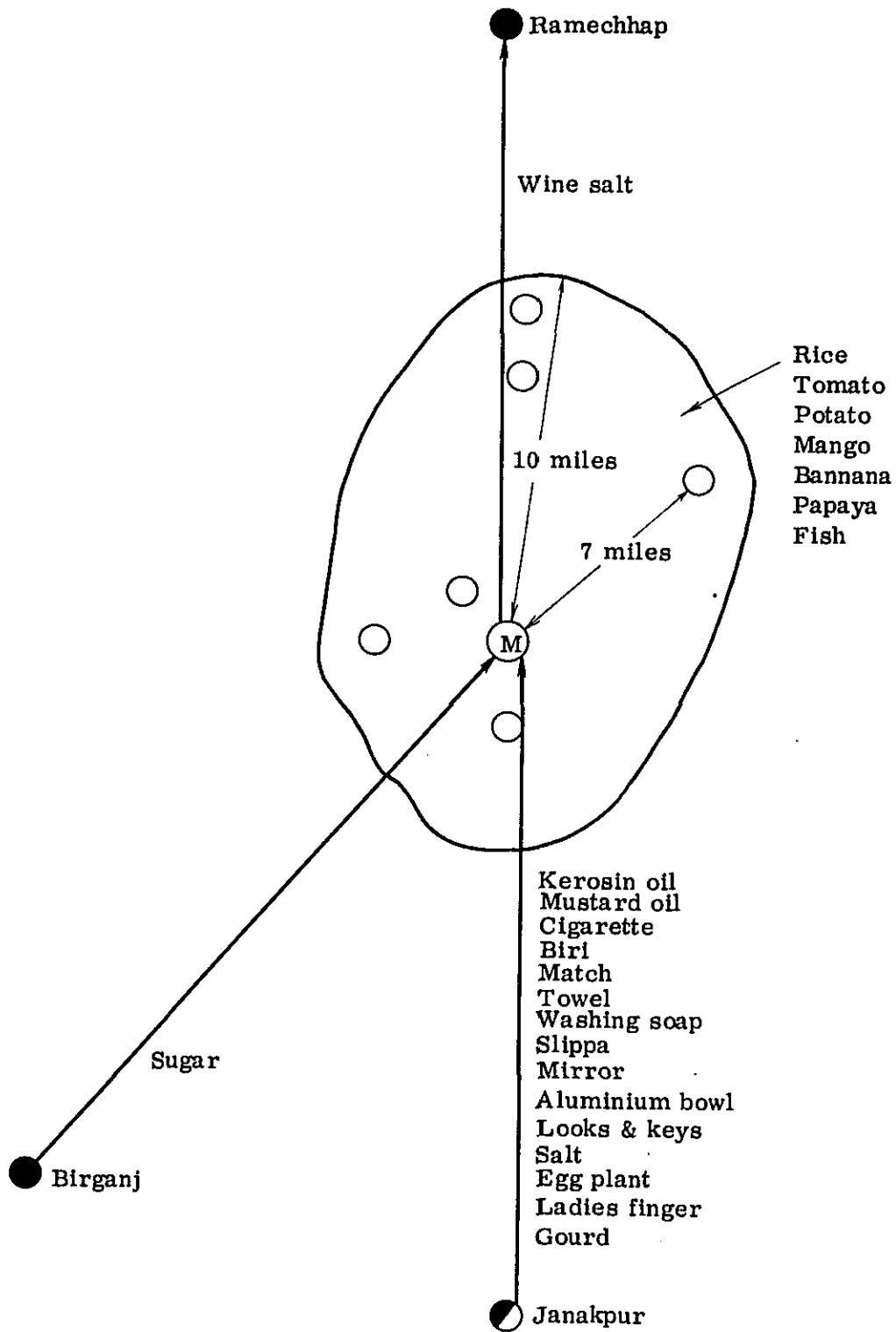


Fig. 6-8 Hill Area (1) Ramechhap Hat

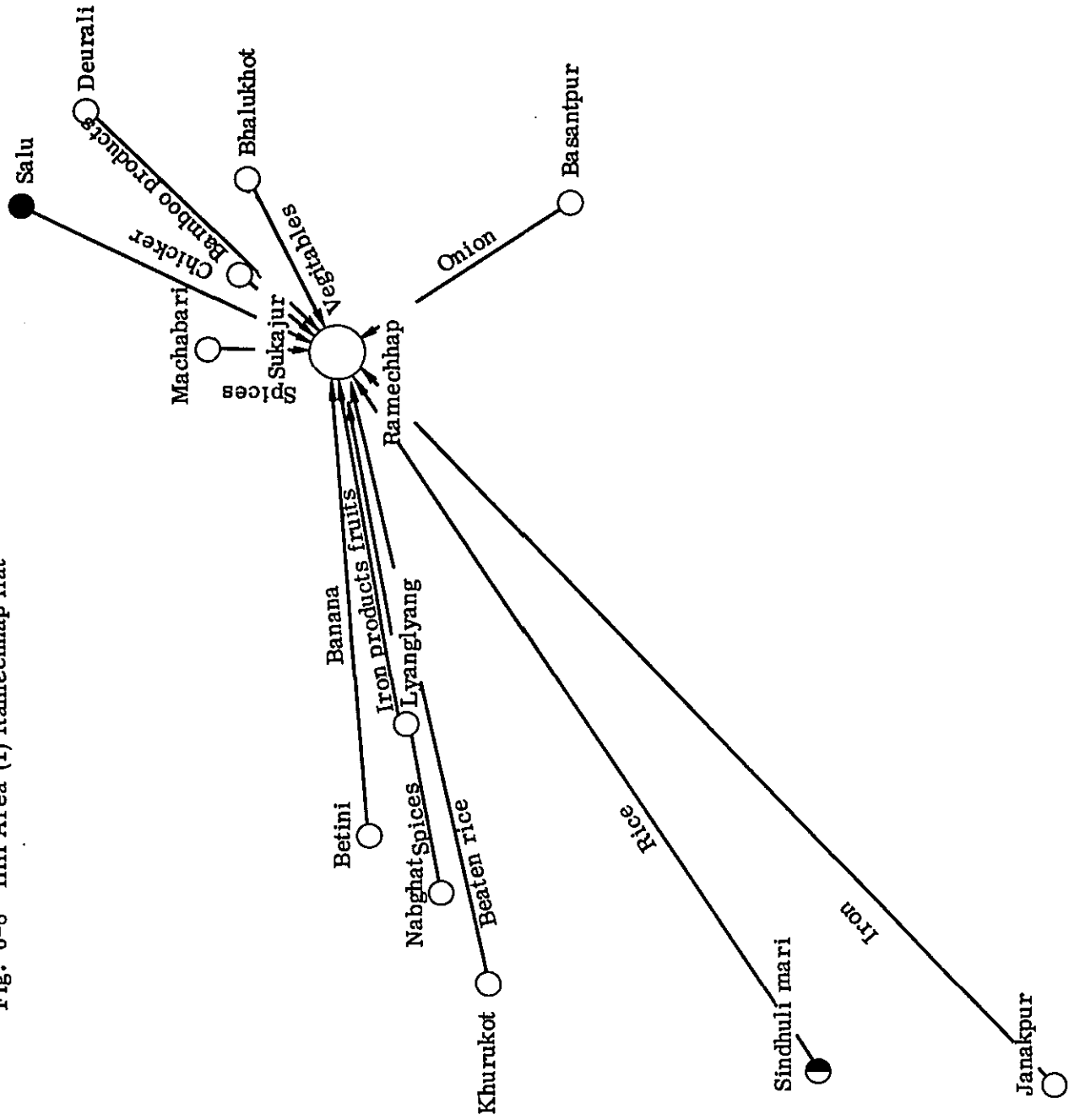
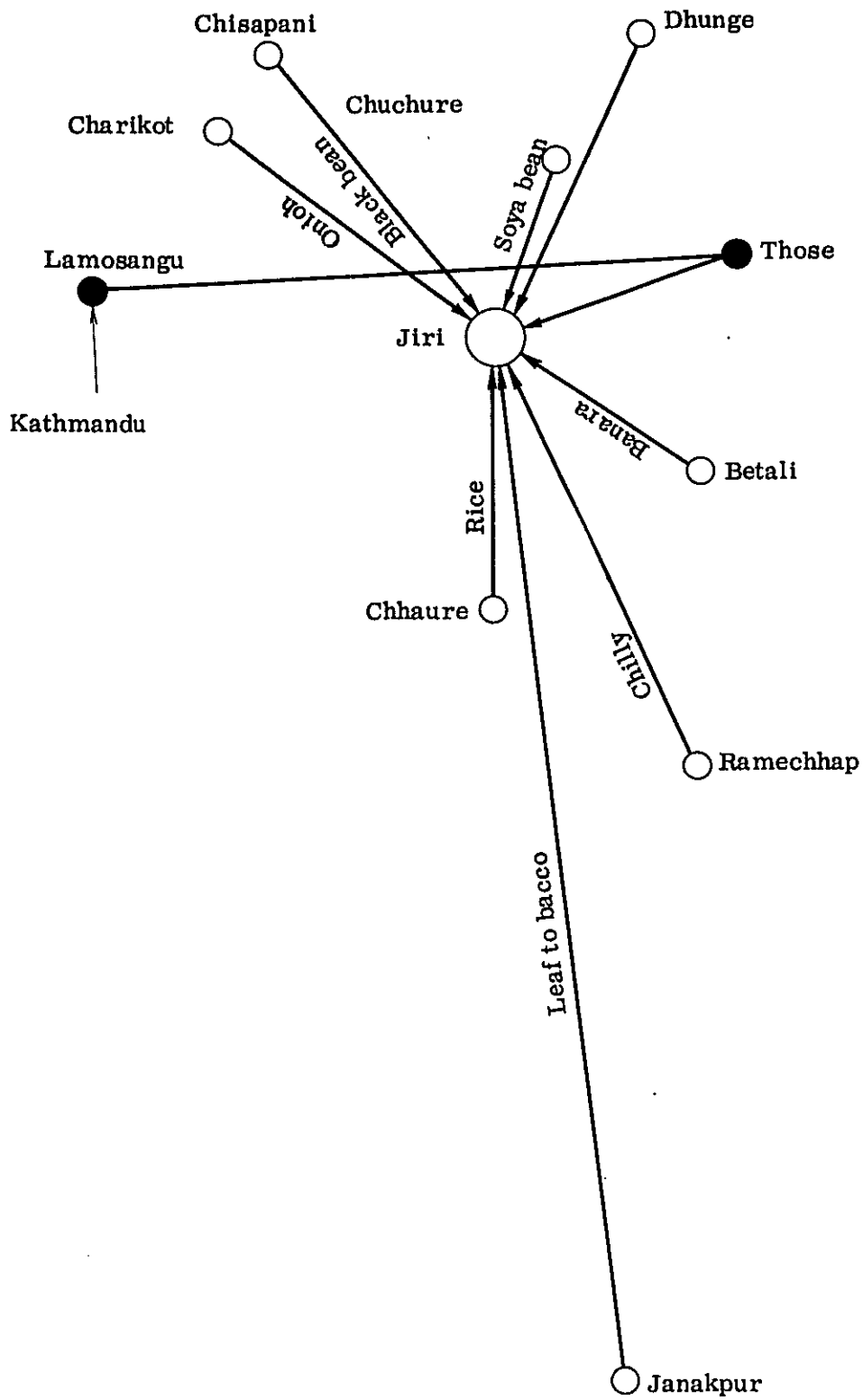


Fig. 6-8 (2) Jiri Hat



6-5. Road Impact Study

1) Effects towards agricultural development (Table 6-1)

(1) Introduction of new crops

35% (7) of the farmers interviewed have introduced new crops, i. e. three farmers introduced sugarcane and four introduced maize. The area along East-West Highway is a chief production district of maize and through the construction of the road into the area sugarcane, which is convertible into money, has been introduced. Sarlahi District is located nearest to the sugar factory in Birganj compared with the other areas in Janakpur Zone and thanks to the completion of East-West Highway it is no longer necessary for people in the area to cross the border line to India to reach Birganj. There will be favourable development for the production of sugarcane if circulation and transportation systems are to be established.

(2) Increase of harvest amount and income

Change of amount of harvest does not receive direct influence by the construction of the Highway. The first impact from the road construction would be the enlargement of market area from the point of demand side, and the introduction of production materials and easier acquisition of technical knowledge from the point of supply side. The change of those factors will naturally lead up to the increase of amount harvested. On our survey 50% (10) of the farmers admitted the increase of harvest amount of agricultural products.

Table 6-1 Change after Road Construction

Change	Yes	No.	Rate of change (%)	
1. Introduction of new crops	7	13	35	
2. Increase in income	7	13	35	
3. Increase in agricultural production	10	10	50	
4. Improvement of food consumption pattern	2	18	10	
5. Purchase of new transportation facilities	3	17	15	
6. Information on new agricultural techniques	2	18	10	
7. Introduction of new agricultural techniques	0	20	0	
8. Price increase on agricultural products	*17	1	95	
9. Price increase of agricultural lang	*18	0	100	
10. Knowledge of JADP	*1	17	6	
11. Improvement of living standards	*14	4	78	
12. Traveling outside Sarlahi District	Before	(A)	5	(B)/(A)=25.4
	After	(B)	127	

* : 2 members couldn't answer this question

(3) Change in price of agricultural products and of land

Most of the people judged the price of agricultural products and that of land had gone up extremely. It is an advantageous for the farmers who own a lot of land and produce the large quantity of agricultural products. In contrast for the poor farmers who hardly own land and have to purchase the agricultural products it means that their condition of living become worse. It is necessary to take a considerate counter measure against the magnification of the difference in condition of living .

(4) Change in agricultural techniques

Improvement of road condition is related to the expansion of information exchange. Information in regards to the introduction of new crops can be obtained from the people in the distant area who could not be contract before. From the surveyd only 10% (2) of the farmers have received new knowledge, but none of them have actually applied the techniques because the road construction has been completed only recently. It is an interesting phenomenon however that there are farmers who have absorbed the new knowledge from the farmers of the other villages in less than a year, implying the natural diffusion of technology by the effect of road construction.

2) Effects towards non-agricultural activities

(1) Modernization of transportation method

15% (3) of the farmers have bought bicycles and began to use them not only for transportation but for communication means. The use of bus for conveyance of agricultural products (as a way of going to and coming from markets) has become emerged.

(2) New work

After the completion of the Highway none started new type works. But the members of tea-houses (' hotel ') increased remarkably. There are about 30 tea-houses at present in Sarlahi District along the East-West Highway, while only 5 tea-houses were counted a few years ago, and those tea-houses seem to play an important role as a place of social and information exchange between the people.

(3) Knowledge on JADP (Janakpur Agricultural Development Project)

Only one out of 18 people knew the existence of JADP as JADP was still at the preparation stage. We believe it is necessary to consider the quickness of information conveyance by way of completion of roads for JADP's activities and procurement of extensive works.

(4) Expansion of sphere of activities

We surveyed how many times the farmers at Harion Panchayat had travelled outside of Sarlahi District and found the changes such as expansion of the sphere of activities and of interregional exchange. Before the completion of the roads the numbers of times of people's travel were only limited to five man-times a year, but after the completion of the roads and the opening of the bus routes the numbers were increased to 127 man-times, that is ;

Kathmandu	21 man-times
Birganj	64 man-times
Hetaura	2 man-times
Janakpur	39 man-times
India	1 man-time

People of Hari9n Panchayat along the East-West Highway travel most frequently to Birganj and that indicates the economic and cultural exchange with Birganj has become intensified. People in Sarlahi District tend to travel to the west of Janakpur Zone i. e. to Birganj, Kathmandu and Hetaura and the total numbers of man-times of their travel to the west Janakpur Zone they only travelled 39 mantimes.

3) Cultural and Psychological Effects

(1) "It's an interesting world! "

- a) Increase of free conversation and zest for knowledge
- b) New interests in communication with outsiders

(2) " It's easy to travel! "

" We can go to see the doctor when we are ill " _____
composure in mind

(3) " No malaria any more! "

_____ Malaria has been decreased in number as Health post dispersing insecticides often owing to the completion of the road.

4) Negative Effects

Some of aforementioned includes negative effects. Also, consideration must be given to control of water because forests are rapidly turned into farm.

6-6. Transportation (Fig. 6-7)

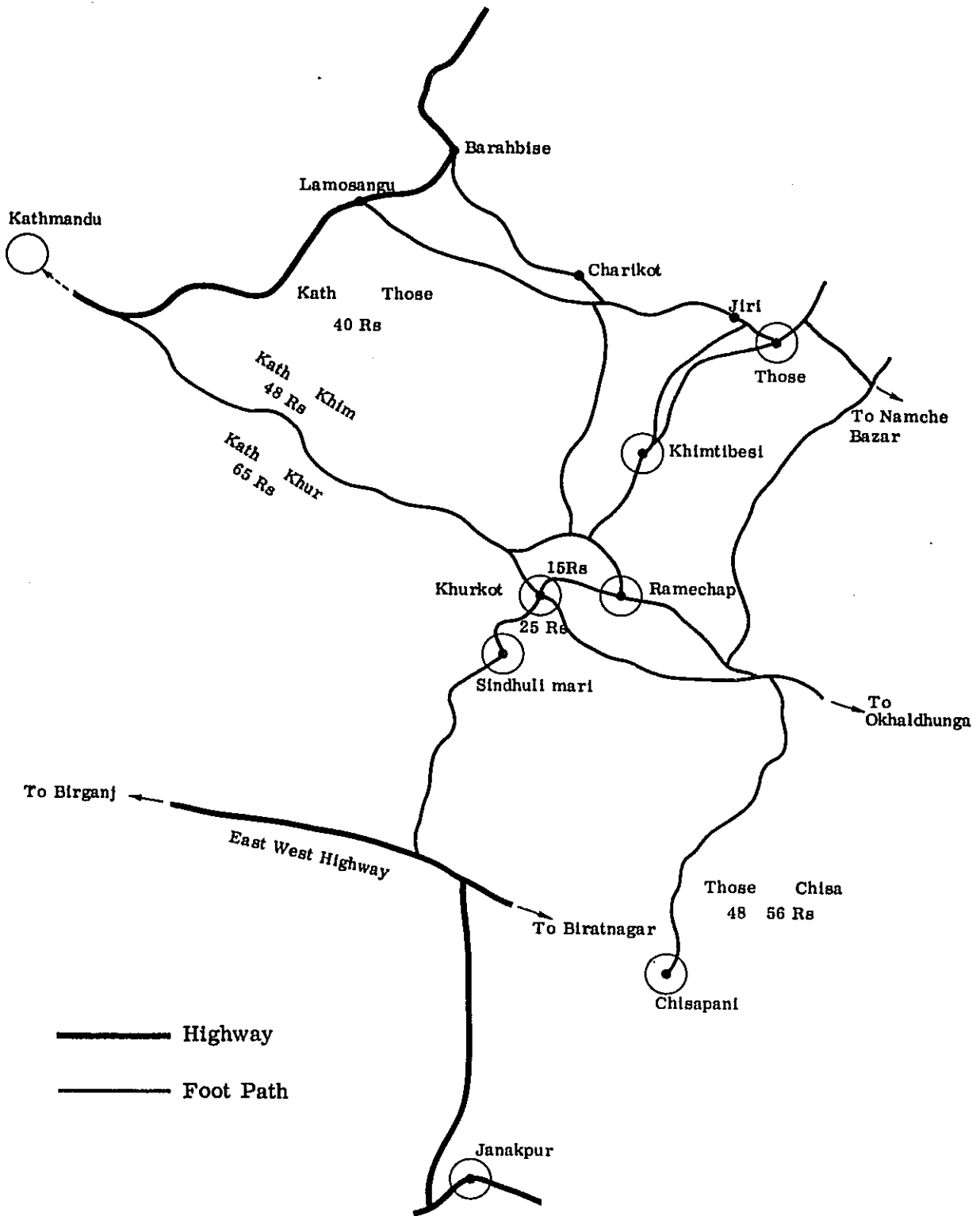
Our team conducted feasibility studies on the transportation of rice from the Tarai plain to the Hill area. However, this is only a trial case study and it is necessary to conduct a more detailed survey on grounds of economic feasibility.

The wholesale price of paddy in the Janakpur market is about 0.90Rs/kg and that of rice, 1.29Rs/kg. The ceiling price of rice in Ramechhap (3.48Rs/kg) occurs in June to August and from September to October. Present transportation costs from Janakpur to Ramechhap

are about 2.13Rs/kg, presuming that the return trip also carries commodities to Janakpur. However, costs for a one way trip averages 1.07Rs/kg. Therefore, total cost, i. e. transportation costs plus whole sale price in the Janakpur market, is approximately 2.36Rs/kg in contrast to the retail price in Ramechhap which is about 1.000Rs/kg. In the case where no commodities are carried on one way, transportation costs for one way from Tarai plain to the Hill area will be higher than in the former case. Hence, it is feasible to consider the following issues when planning the transportation of rice :

- (1) Clarification of the costs of rice milling and storage.
- (2) Transportation costs of rice can be reduced in terms of bringing along money convertible products from the Hill area to Tarai plain.
- (3) Transporting commodities in bulk.

Fig. 6-9 Transportation Route and Cost (Unit: Rs/md. man)



7 Tables and Charts

7. TABLES AND CHARTS

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- Table 7-2-1 Per Capita Expenditure of the Inhabitants in Sarlahi
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- Table 7-3-1 Regional Price Fluctuation
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- Fig. 7-4-1 Flow of Commodities into Each Market
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7 - 1 Production

Table 7-1-1 Regional Food and Cash Crop Production and Their Percentage Distribution (1970 - 1971)

	000 M/T					
	Eastern Tarai	Western Tarai	Inner Tarai	Eastern Hill	Western Hill	Total
Paddy	(52) 182.2	(22) 507.0	(6) 149.4	(9) 213.3	(11) 217.9	(100) 2304.8
Maize	(7) 64.2	(11) 88.6	(13) 107.5	(31) 256.9	(38) 316.1	(100) 833.3
Wheat	(19) 37.4	(19) 36.6	(5) 9.5	(20) 37.8	(37) 71.9	(100) 193.2
Barley	(15) 3.8	(6) 1.4	(2) 0.5	(13) 3.2	(64) 16.3	(100) 25.2
Millets	(8) 10.2	(4) 5.7	(3) 4.8	(29) 36.8	(56) 72.6	(100) 129.5
Sugarcane	(55) 130.7	(29) 67.4	(3) 7.1	(4) 8.8	(9) 21.6	(100) 235.6
Jute	(95.5) 50.0	(0.4) 0.2	(4.0) 2.1	- -	- -	(100) 52.9
Oilseed	(17) 9.3	(28) 15.4	(40) 21.9	(8) 4.5	(7) 3.8	(100) 54.2
Tobacco	(85) 5.8	(6) 0.4	(5) 0.4	(1) 0.1	(3) 0.2	(100) 6.9
Potato	(15) 39.9	(9) 23.9	(5) 13.8	(47) 129.6	(24) 66.2	(100) 273.4

Source : PP23-25 "Agricultural Statistics of Nepal"
Economic Analysis and Planning Division, M. F. A. Nepal 1972

7-1-2 Regional Comparison of Land, Population and Production

Item District	Total area (A)	Area under cultivation (B)	General grain production (C)	Population (D)	(C) / (D)	(B) / (D)	(B) / (A)
Dolakha	198	6.0	13.9	125	0.11	0.05	3
Ramechhap	137	12.5	28.9	151	0.19	0.08	9
Sindhuli	259	14.0	30.7	139	0.22	0.10	5
Sarlahi	138	48.6	86.9	170	0.51	0.29	35
Mahotari	125	95.8	123.8	327	0.38	0.29	77
Dhanusha	119	100.2	120.9	323	0.37	0.31	84
Total	976	272.1	405.1	1,235	0.33	0.22	28

Source : PP15, 75, "Agricultural Statistics of Nepal",

Economic Analysis and Planning Division,

M. F. A., Nepal, 1972

7-1-3 Agricultural Production by Crops in Each District of Janakpur Zone (1970 - 71)

	Paddy	Maize	Wheat	Millet	Barley	Potato	Oil-Seed	Sugarcane	Jute	Tobacco
Dolakha	4.2	8.2	0.4	1.0	0.1	4.2	0.1	0.1	-	-
Ramechhap	10.2	16.1	0.6	2.0	0.1	4.6	0.1	0.1	-	-
Sindhuli	14.4	12.9	1.5	1.8	-	3.6	2.7	1.1	0.02	0.04
Sarlahi	71.7	12.5	1.8	0.6	0.2	2.3	0.9	1.5	0.03	0.21
Mahotari	113.4	6.8	2.5	0.9	0.2	2.3	0.5	1.4	0.03	1.86
Dhanusha	108.0	7.9	3.1	1.6	0.3	3.3	0.8	0.9	0.05	1.76
Total	321.9	64.4	9.9	7.9	0.9	22.4	5.1	5.1	0.13	3.87

000 M/T

Source : P28, " Agricultural Statistics of Nepal ",
Economic Analysis and Planning Division,
M. F. A., Nepal, 1972

7-1-4 Irrigating Capacity and Actual Utilization

Item	1966/67		1967/68	
	Irrigating Capacity (A)	Actual Utilization (B)	(A)	(B)
Dolakha	-	-	-	580
Ramechhap	-	-	-	322
Sindhuli	-	-	-	1,844
Sarlahi	-	1,000	27,416	1,199
Mahotari	-	1,600	} 41,680	9,553
Dhanusha	-	2,140		

Source : 1966/67 Irrigation and Drinking Water Department
 1967/68 National Planning Commission Secretary
 Project Planning Unit

7 - 2 Consumption

Table 7-1-5 Agricultural Production in Sarlahi District

Item	Northern Part					Middle Part								Southern Part		
	V11	V12	V13	V14	V15	V21	V22	V23	V24	V25	V26	V27	V28	V31	V32	V33
1. Paddy	(4.7) 7	(0.0) -	(32.6) 125	(9.9) 12	(4.2) 10	(74.7) 65	(57.1) 200	(71.4) 40	(55.6) 20	(45.1) 60	(60.7) 125	(43.1) 300	(83.3) 25	(58.5) 100	(43.5) 400	(25.3) 125
2. Wheat	(2.7) 4	(0.0) -	(6.5) 25	(13.2) 16	(2.1) 5	(8.0) 7	(3.7) 13	(3.6) 2	(5.6) 2	(6.8) 9	(9.7) 20	(6.5) 45	(0.0) -	(11.7) 20	(21.8) 200	(30.3) 150
3. Maize	(83.9) 125	(50.0) 60	(52.2) 200	(49.6) 60	(84.4) 200	(9.2) 8	(4.3) 15	(8.9) 5	(5.6) 2	(9.0) 12	(9.7) 20	(7.2) 50	(0.0) -	(8.8) 15	(21.8) 200	(32.3) 160
4. Millet	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(2.3) 2	(2.0) 7	(7.1) 4	(11.1) 4	(5.3) 7	(2.4) 5	(0.0) -	(0.0) -	(0.0) -	(5.4) 50	(4.0) 20
5. Pulse	(8.7) 13	(50.0) 60	(6.5) 25	(5.8) 7	(8.4) 20	(3.4) 3	(2.9) 10	(3.6) 2	(11.1) 4	(15.0) 20	(14.6) 30	(4.3) 30	(16.7) 5	(8.8) 15	(4.3) 40	(6.0) 30
6. Vegetable	(0.0) -	(0.0) -	(2.1) 8	(21.5) 26	(0.8) 2	(2.3) 2	(1.4) 5	(5.4) 3	(11.1) 4	(3.8) 5	(2.4) 5	(4.3) 30	(0.0) -	(11.7) 20	(2.7) 25	(2.0) 10
7. Fruits	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(28.6) 100	(0.0) -	(0.0) -	(15.0) 20	(0.5) 1	(1.6) 11	(0.0) -	(0.6) 1	(0.4) 4	(0.0) -
8. Sugarcane	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(32.3) 225	(0.0) -	(0.0) -	(0.0) -	(0.0) -
9. Tobacco	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.03) 0.06	(0.7) 5	(0.0) -	(0.0) -	(0.0) -	(0.0) -
10. Jute	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -	(0.0) -
Total	(100.0) 149	(100.0) 120	(100.0) 383	(100.0) 121	(100.0) 237	(100.0) 87	(100.0) 350	(100.0) 56	(100.0) 36	(100.0) 133	(100.0) 206	(100.0) 196	(100.0) 30	(100.0) 171	(100.0) 919	(100.0) 495

Unit %
md

* Vmn : Number of Villages

* V14 : He has a paddy field in Ramechhap District. But the production from that field is excluded from this table.

Table 7-2-1 Per Capita Expenditure of the Inhabitants in Sariahi District (1972)

Region	Northern Region		Middle Region		Southern Region		Average in Sariahi District	
	Rs	%	Rs	%	Rs	%	Rs	%
1. Cereal Grains	1,045	40.4	730	48.2	865	29.7	854	40.4
2. Pulse	136	5.3	118	7.8	258	8.9	150	7.1
3. Vegetables	70	2.7	93	6.1	204	7.0	107	5.1
4. Fruits	10	0.4	8	0.5	6	0.2	8	0.4
5. Fish and Meat	325	12.6	124	8.2	312	10.7	222	10.5
6. Other Food	163	6.3	100	6.6	125	4.3	124	5.9
Sub Total	1,749	67.6	1,173	77.5	1,770	60.7	1,465	69.3
7. Manufactural Products	407	15.7	175	11.6	358	12.3	282	13.3
8. Education	29	1.1	46	3.0	393	13.5	106	5.0
9. Festival	322	12.5	56	3.7	299	10.3	185	8.8
10. Medical Purpose	79	3.1	64	4.2	95	3.3	75	3.5
Total	2,586	100.0	1,514	100.0	2,915	100.0	2,113	100.0

*1 : Five farmers along the East-West Highway

*2 : Eight farmers in the Middle Region

*3 : Three farmers along the Indian border

*4 : Average Expenditure of 16 farmers in Sariahi District

*5 : The value of this table was calculated such as ;

(Quantities consumed) x (Average price in 9 markets of Sariahi District)

7 - 3 Price

Table 7-2-2 Per Capita Consumption and Requirements in Sarlahi District in kg. (1972)

	Northern Region			Middle Region			Southern Region			Sarlahi District		
	A	B	C	A	B	C	A	B	C	A	B	C
Rice	(28.8) 233	(26.3) 248	▲ 15	(39.1) 217	(40.9) 253	▲ 36	(21.5) 183	(25.6) 227	▲ 44	(31.3) 216	(31.8) 246	▲ 30
Wheat	(12.0) 97	(10.8) 102	▲ 5	(13.0) 72	(7.6) 47	25	(11.4) 97	(12.4) 110	▲ 13	(12.2) 84	(10.3) 80	4
Maize	(31.9) 258	(29.4) 278	▲ 20	(11.9) 66	(6.6) 41	25	(24.2) 206	(17.4) 154	52	(22.1) 152	(17.6) 136	16
Millet	(0.0) 0	(0.0) 0	0	(3.6) 20	(3.2) 20	0	(1.3) 11	(3.4) 30	▲ 19	(1.7) 12	(2.1) 16	▲ 4
Pulse	(7.9) 64	(8.3) 78	▲ 14	(10.6) 59	(12.8) 79	▲ 20	(14.2) 121	(13.7) 121	0	(10.4) 72	(11.3) 87	▲ 15
Vegetables	(6.6) 53	(8.1) 76	▲ 23	(12.6) 70	(12.5) 77	▲ 7	(18.0) 153	(17.5) 155	▲ 2	(11.6) 80	(11.8) 91	▲ 11
Fruits	(3.0) 24	(6.9) 65	▲ 41	(1.1) 6	(2.4) 15	▲ 9	(1.6) 14	(2.0) 18	▲ 4	(1.9) 13	(4.0) 31	▲ 18
Meat	(3.5) 28	(4.0) 38	▲ 10	(1.3) 7	(3.6) 22	▲ 15	(2.5) 21	(2.5) 22	▲ 1	(2.3) 16	(3.5) 27	▲ 11
Fish	(1.5) 12	(1.2) 11	1	(1.4) 8	(3.1) 19	▲ 11	(2.1) 18	(2.1) 19	▲ 1	(1.6) 11	(2.1) 16	▲ 5
Sugar	(2.3) 19	(2.8) 26	▲ 7	(1.3) 7	(2.3) 14	▲ 7	(1.8) 15	(1.8) 16	▲ 1	(1.7) 12	(2.3) 18	▲ 6
Chili	(0.6) 5	(0.4) 4	1	(1.3) 7	(1.9) 12	▲ 5	(0.4) 3	(0.3) 3	0	(0.9) 6	(1.0) 8	▲ 2
Tea	(0.1) 0.8	(0.1) 1.3	▲ 0.5	(0.1) 0.3	(0.1) 0.7	▲ 0.4	(0.0) 0.4	(0.0) 0.4	0	(0.1) 0.5	(0.1) 0.9	▲ 0.4
Salt	(1.9) 15	(1.8) 17	▲ 2	(2.9) 16	(2.9) 18	▲ 2	(1.2) 10	(1.1) 10	0	(2.0) 14	(2.1) 16	▲ 2
Total	(100.0) 809	(100.0) 944	▲ 135	(100.0) 555	(100.0) 618	▲ 63	(100.0) 852	(100.0) 885	▲ 33	(100.0) 689	(100.0) 773	▲ 84

A : Present Consumption B : Requirements C : Sarplus or Deficit (▲)

Table 7-2-3 Per Capita Food Consumption (1972)

Item Products	Sarlahi District				Japan *4				(B) - (A)	(B-A) x 100 A	(A) - (C)	(A) / (C)
	Present (A)		Requirement (B)		1965 (C)		1970					
	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%
1. Rice	216	31.3	246	31.8	112	30.2	95	25.0	30	14	104	1.9
2. Wheat	84	12.2	80	10.3	29	7.8	31	8.2	▲ 4	▲ 4	55	2.9
3. Maize	152	22.1	136	17.6	*2 1	0.3	1	0.3	▲ 16	▲ 11	163	164.0
4. Millet	12	1.7	16	2.1					4	33		
5. Pulse	72	10.4	87	11.3	10	2.7	10	2.6	15	21	62	7.2
6. Vegetables *1	80	11.6	91	11.8	132	35.6	132	34.7	11	14	▲ 52	0.6
7. Fruits	13	1.9	31	4.0	29	7.8	38	10.0	18	138	▲ 16	0.4
8. Meat	16	2.3	27	3.5	9	2.4	13	3.4	11	69	7	1.8
9. Fish	11	1.6	16	2.1	30	8.1	33	8.7	5	45	▲ 19	0.4
10. Sugar	12	1.7	18	2.3	19	5.1	27	7.1	6	50	▲ 7	0.6
11. Chilly	6	0.9	8	1.0	-	-	-	-	2	33	-	-
12. Tea	0.5	0.1	0.9	0.1	-	-	-	-	0.4	80	-	-
13. Salt	14	2.0	16	2.1	-	-	-	-	2	14	-	-
Total	689	100.0	773	100.0	*3 371	100.0	*3 380	100.0				

* 1 : Green Vegetables + Potatoes

* 2 : Miscellaneous Cereals

* 3 : Excluding Chilly, Tea and Salt

* 4 : Source : " Japan Statistical Yearbook, 1971 ",

Bureau of Statistics Office of the Prime Minister, Japan

1. Rice (1972)

Month District	RS/kg										
	1	2	3	4	5	6	7	8	9	10	
Ramechhap	2.95	3.22	3.48	3.48	3.35	3.48	3.22	2.55	2.14	2.68	2.81
Dhanusha	1.66	2.03	2.17	2.22	2.16	2.20	2.03	1.88	1.53	1.73	1.71
Mahotari	1.84	1.92	2.11	2.21	2.32	2.35	2.29	2.11	1.57	1.63	1.72
Sarlahi	-	-	-	-	-	-	-	-	-	-	-

2. Maize (1972)

District	Rs/kg										
	1	2	3	4	5	6	7	8	9	10	
Ramechhap	2.13	2.13	2.26	2.13	1.60	1.47	1.34	1.34	1.60	1.70	1.77
Dhanusha	1.60	1.60	2.13	1.60	0.85	1.06	1.04	1.06	1.12	0.90	0.96
Mahotari	1.54	1.28	1.33	1.33	1.06	1.06	1.22	1.22	1.06	1.28	1.28
Sarlahi	-	-	-	-	-	-	-	-	-	-	-

3. Potato (1972)

District	Rs/kg										
	1	2	3	4	5	6	7	8	9	10	
Ramechhap	1.28	1.50	1.71	1.50	1.28	1.39	2.14	2.14	2.99	2.99	2.14
Dhanusha	1.00	1.47	1.33	1.20	1.47	1.33	1.39	1.39	0.94	0.94	0.80
Mahotari	1.06	1.20	1.33	1.20	1.47	1.47	1.60	1.20	0.80	1.20	1.20
Sarlahi	-	-	-	-	-	-	-	-	-	-	-

* 1) Dhanusha : Janakput market

2) Mahotari : Jaleswar market 3) Sarlahi : Malangwa

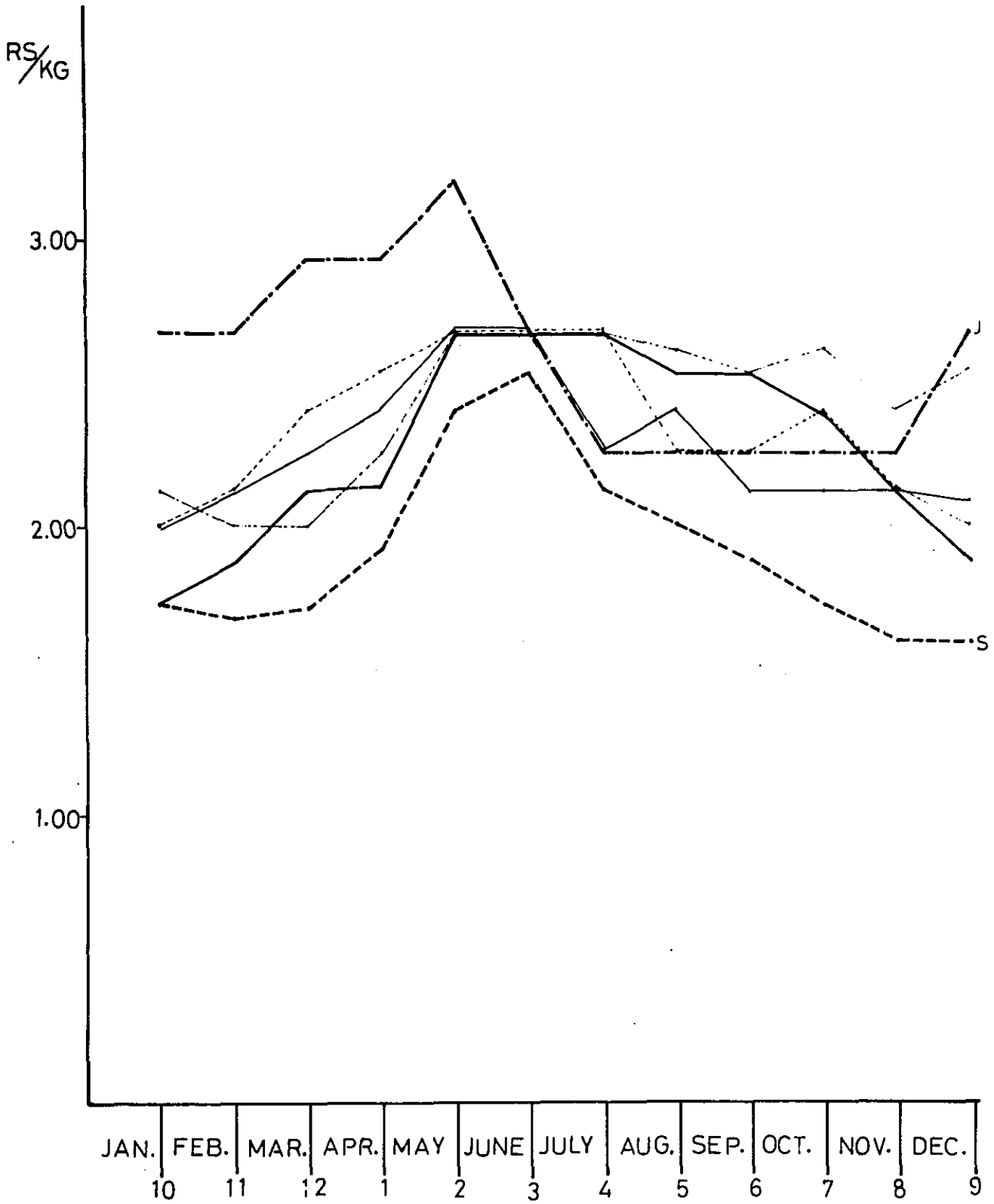
* Month : Nepalese month

Source : Nepal Rastra Bank, 1973

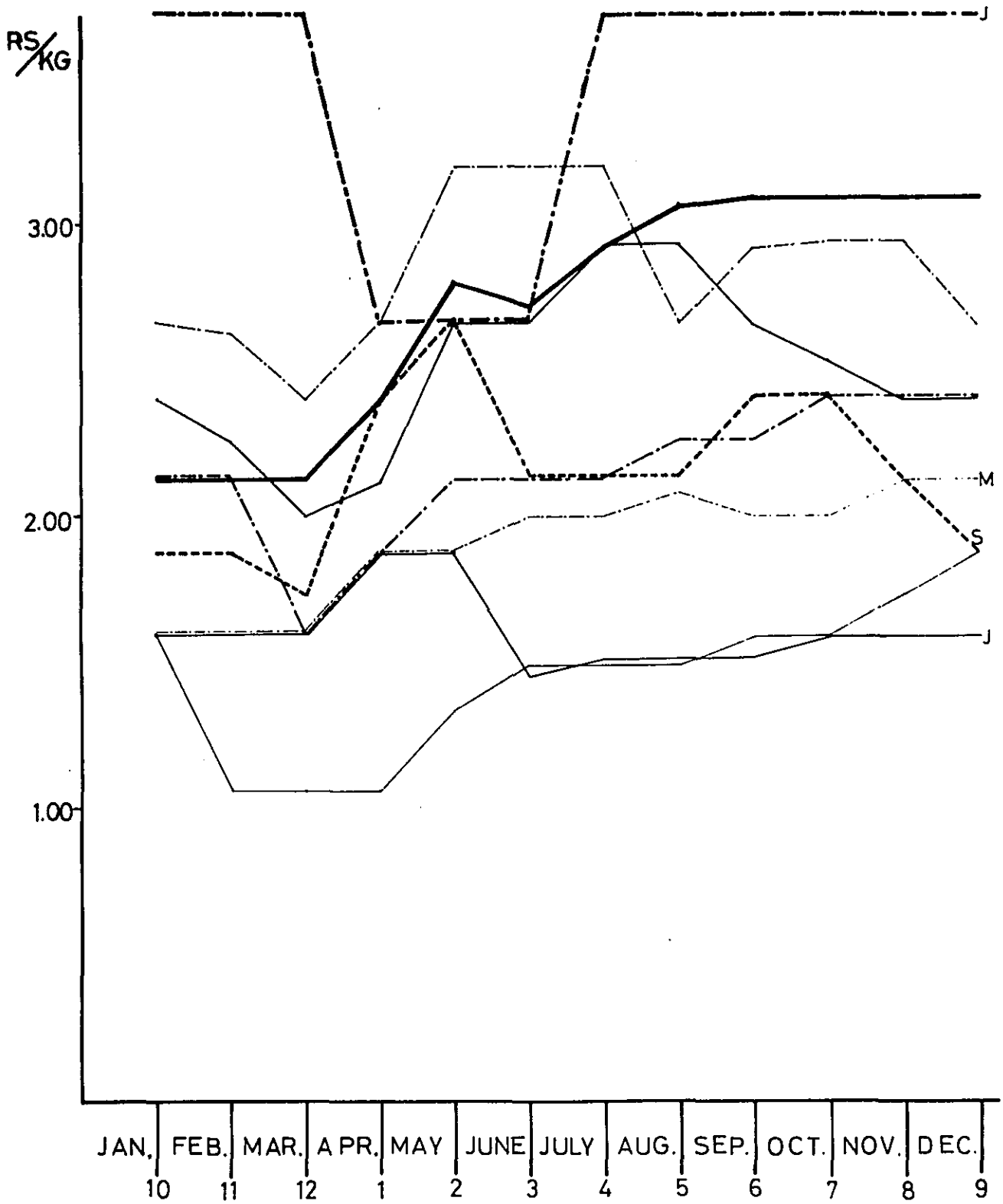
Fig. 7-3-1 Price Fluctuation of Main Crops

	Name of Market
-----	Raniganj
-----	Harion
—————	Mahendra
—————	Harpur
—————	Barahathawa
—————	Sunderpur
-----	Tribhuwan
-----	Malangwa
-----S	Sakhuwa
-----J	Janakpur
-----J	Jaleswar
-----M	Matihani

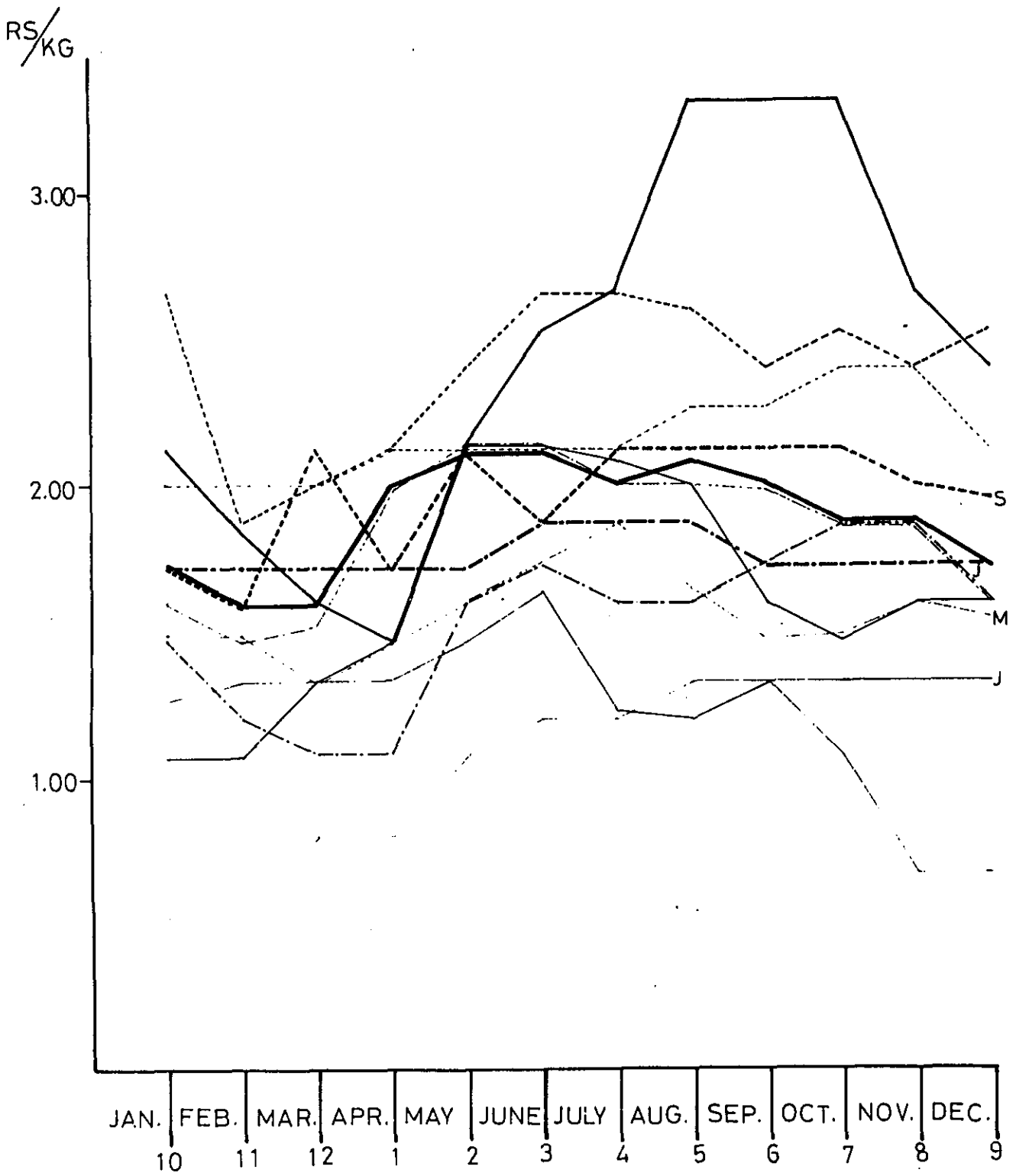
Price of Thin Rice (1972-73)



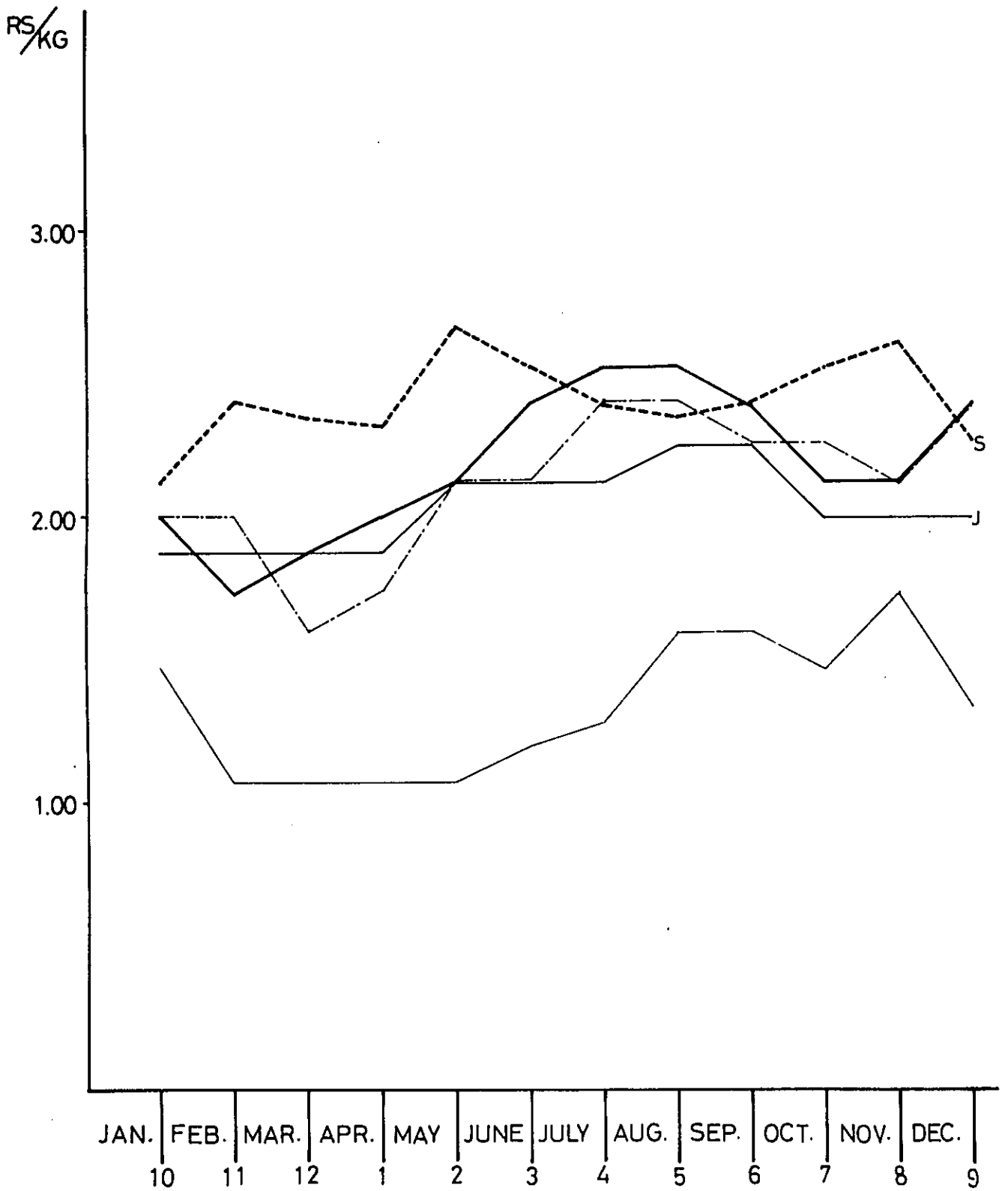
Price of Arahar (1972-73)



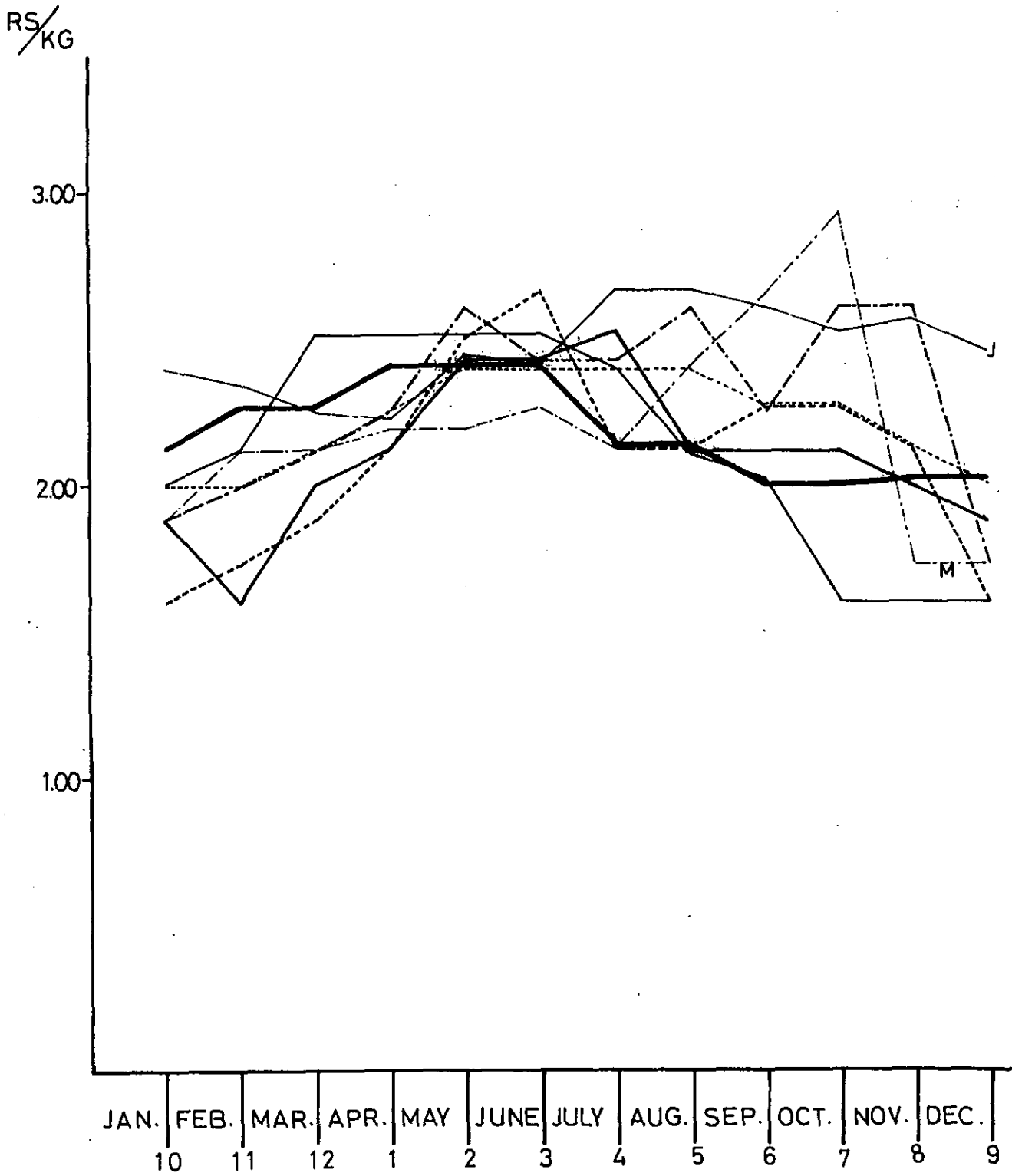
Price of Khesari (1972-73)



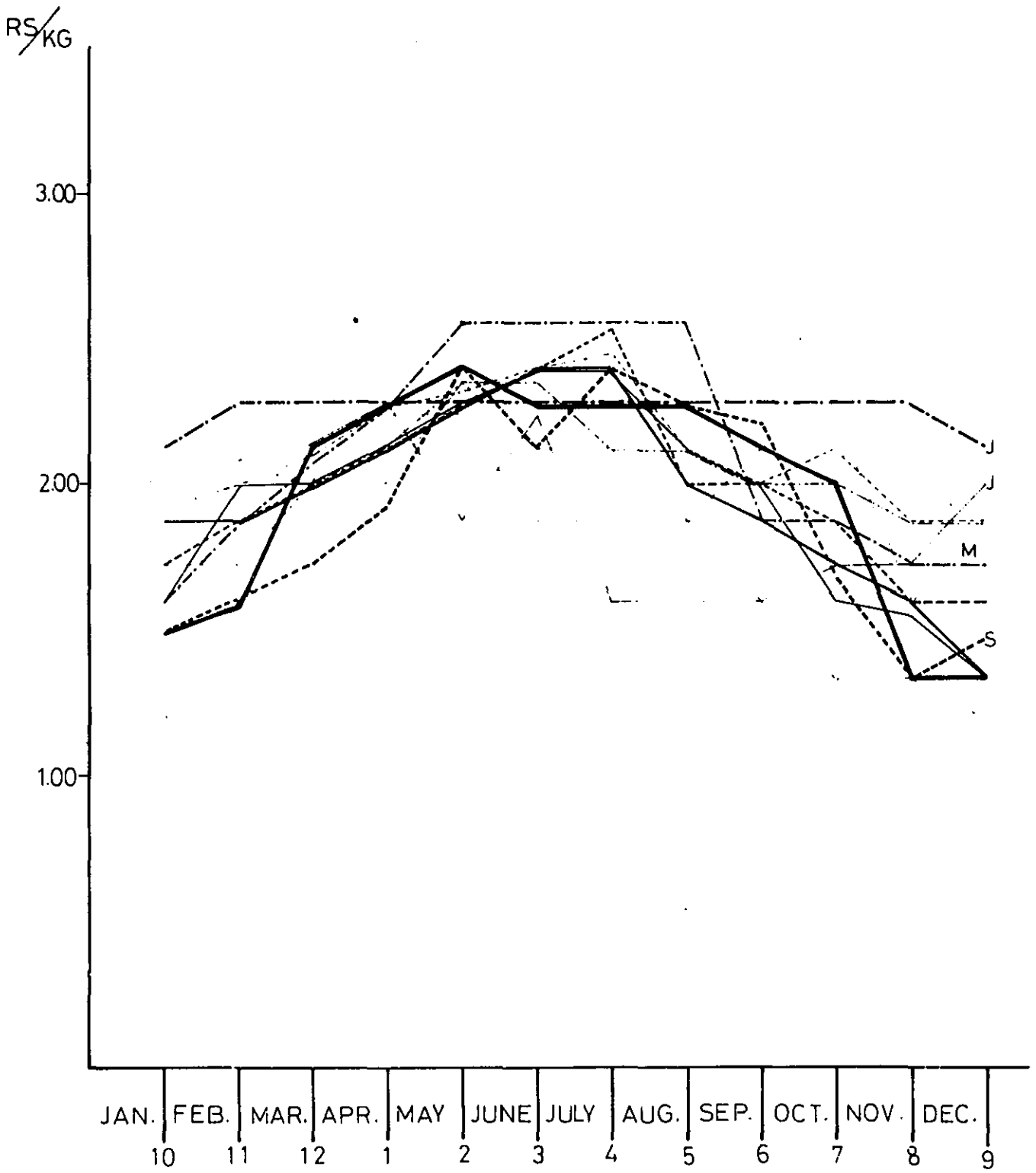
Price of Motar (1972-73)



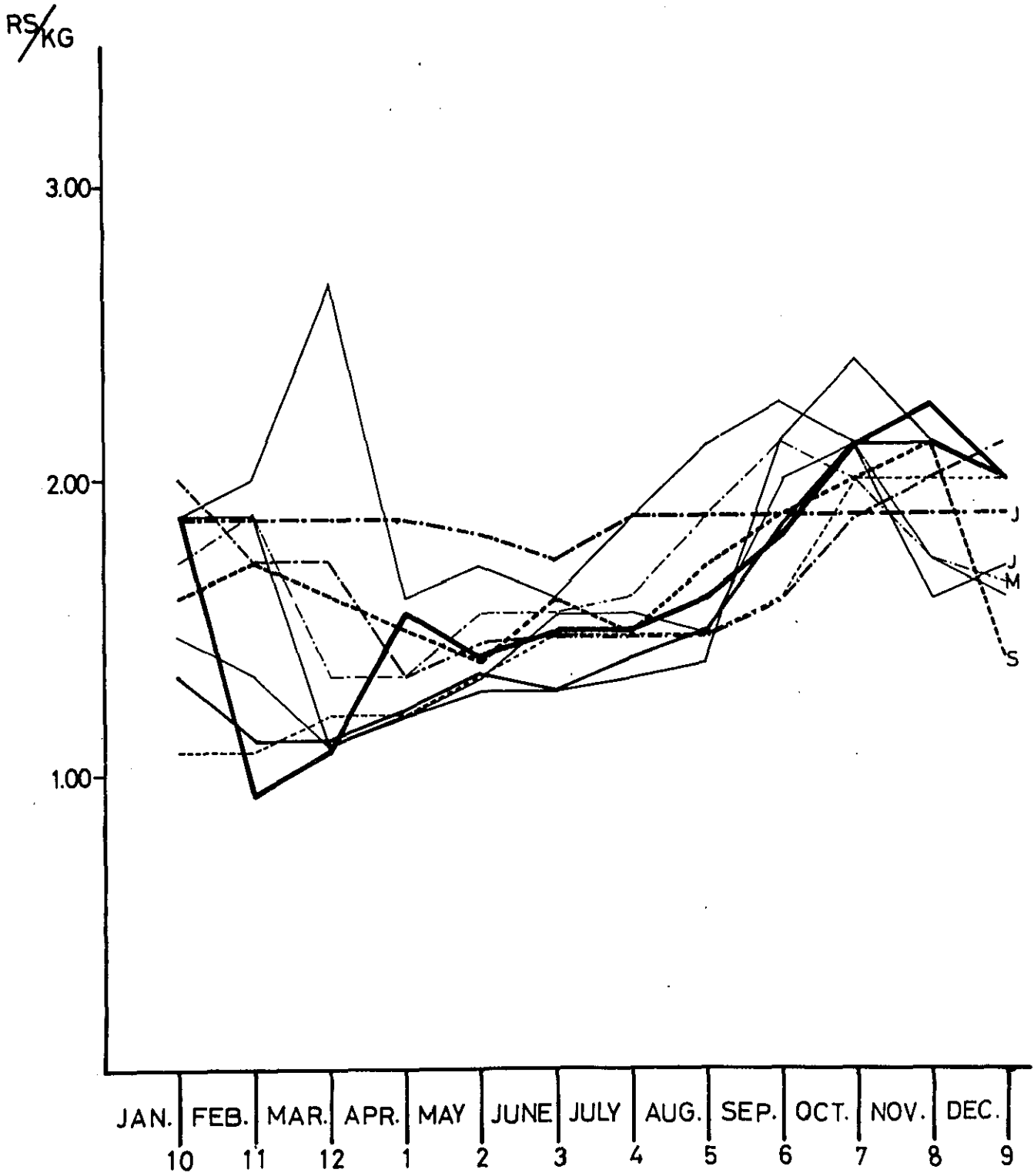
Price of Thick Rice (1972-73)



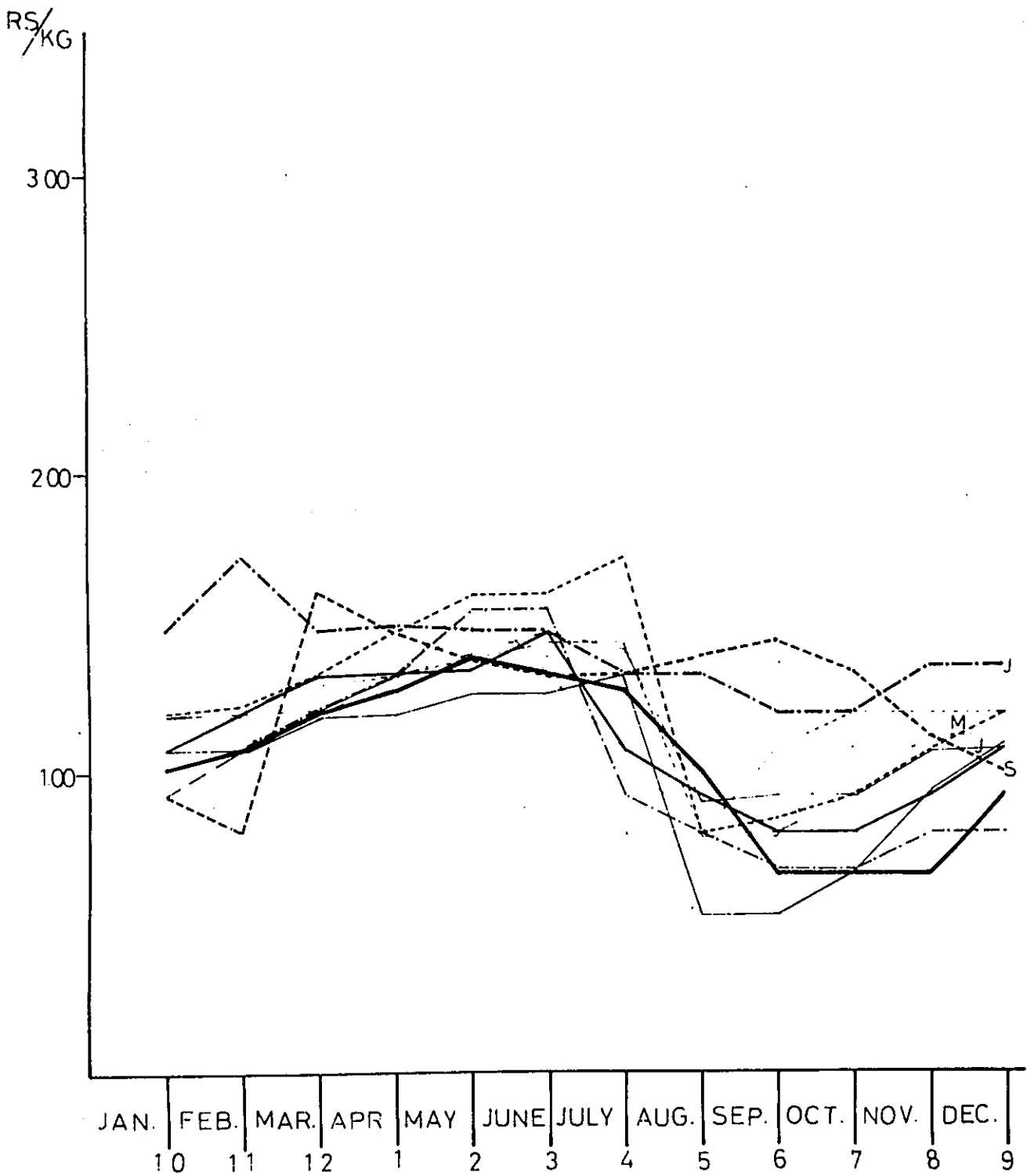
Price of Bitter Rice (1972-73)



Price of Wheat (1972-73)

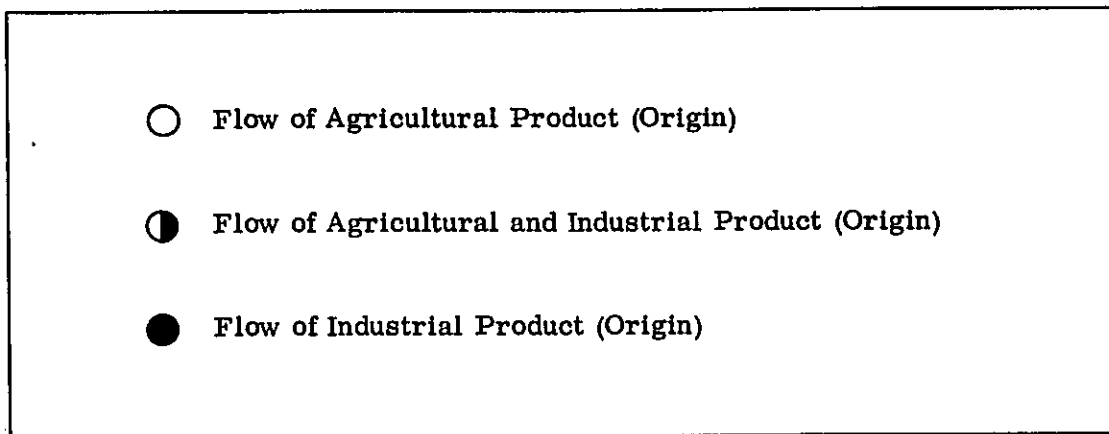


Price of Maize (1972-73)

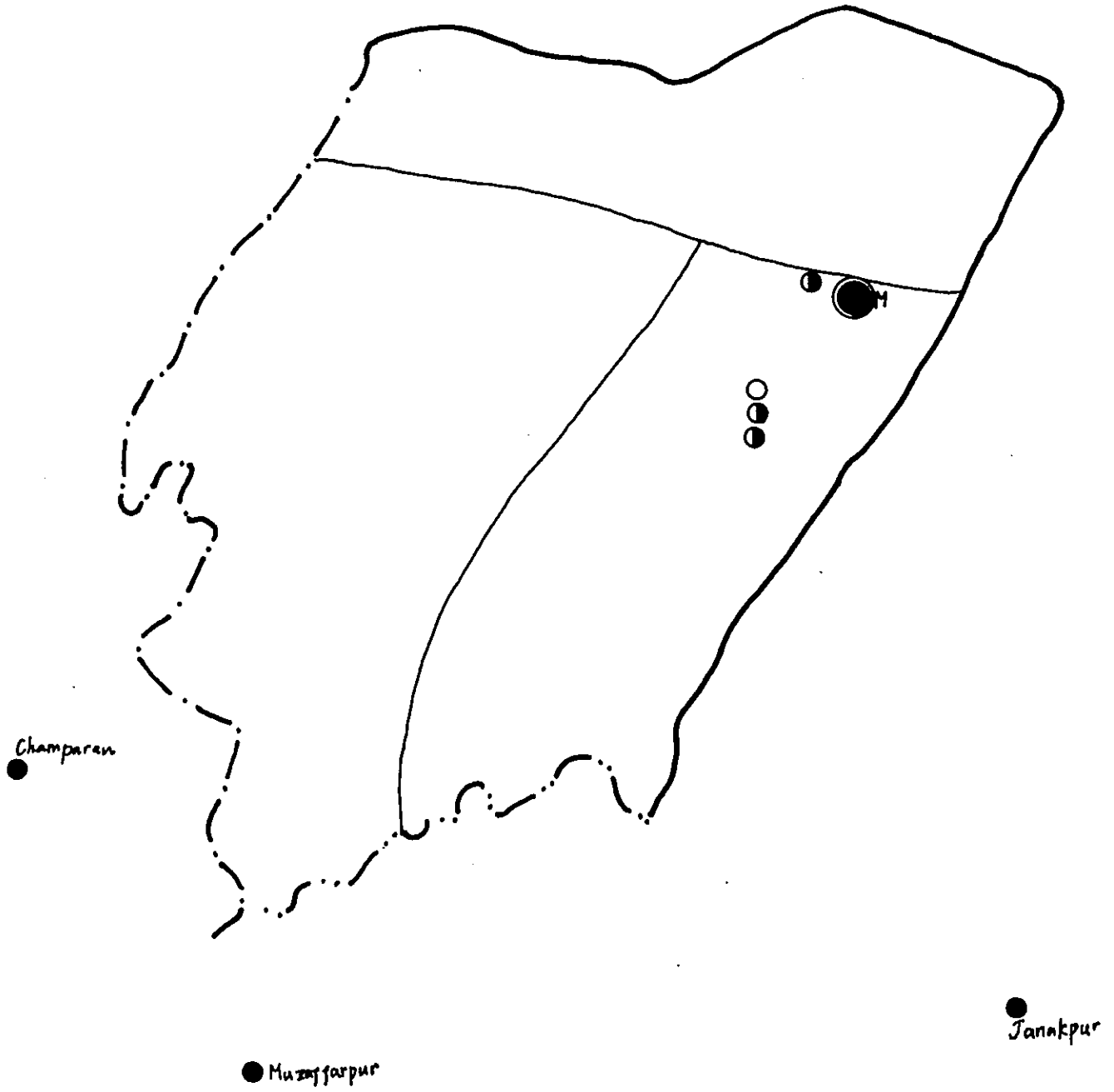


7-4 Origin Destination of Flow of Commodities, Sellers and Purchasers

Fig. 7-4-1 Flow of Commodities into Each Market

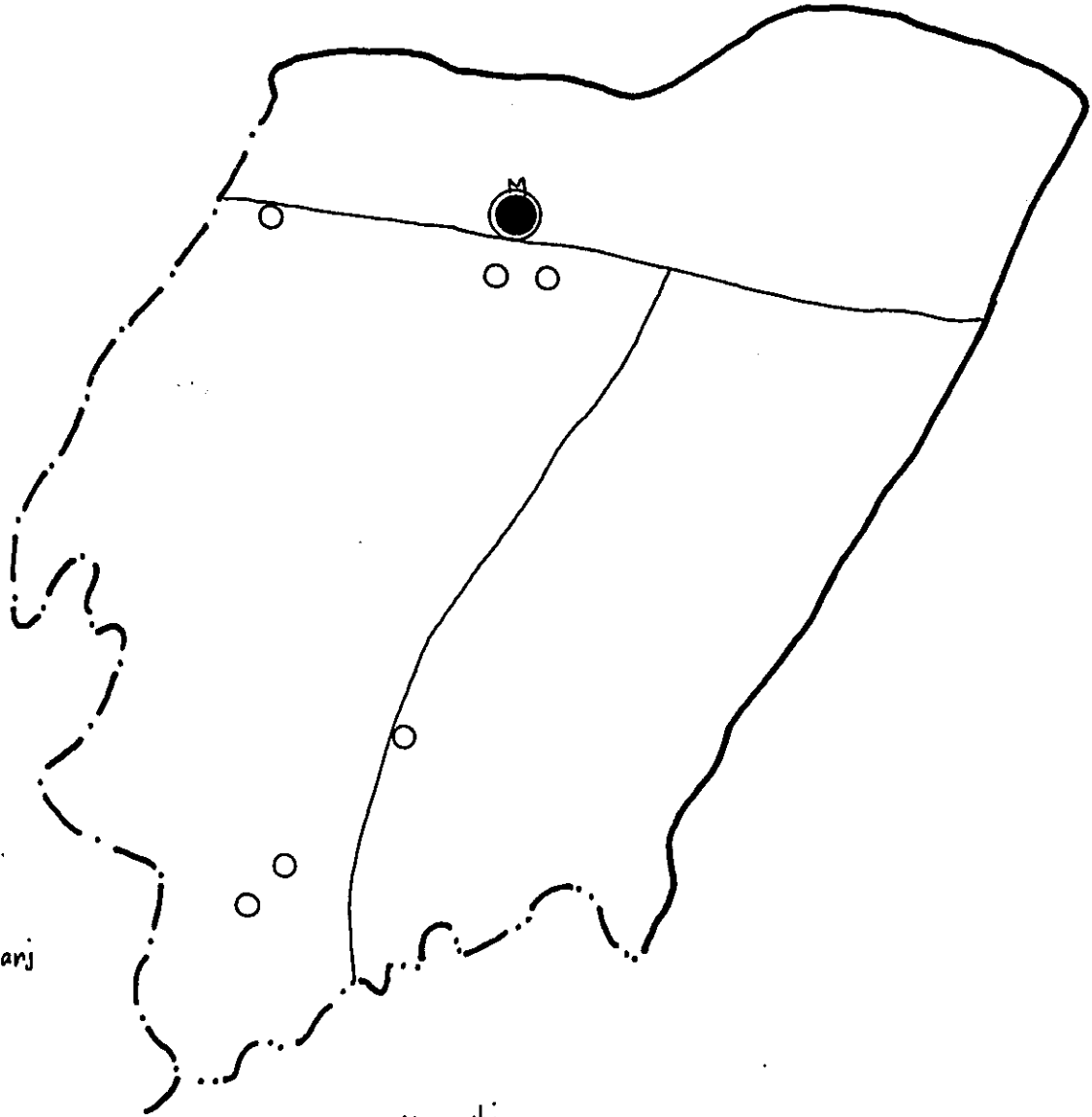


Ranigang Market



Harion Market

● Kathmandu

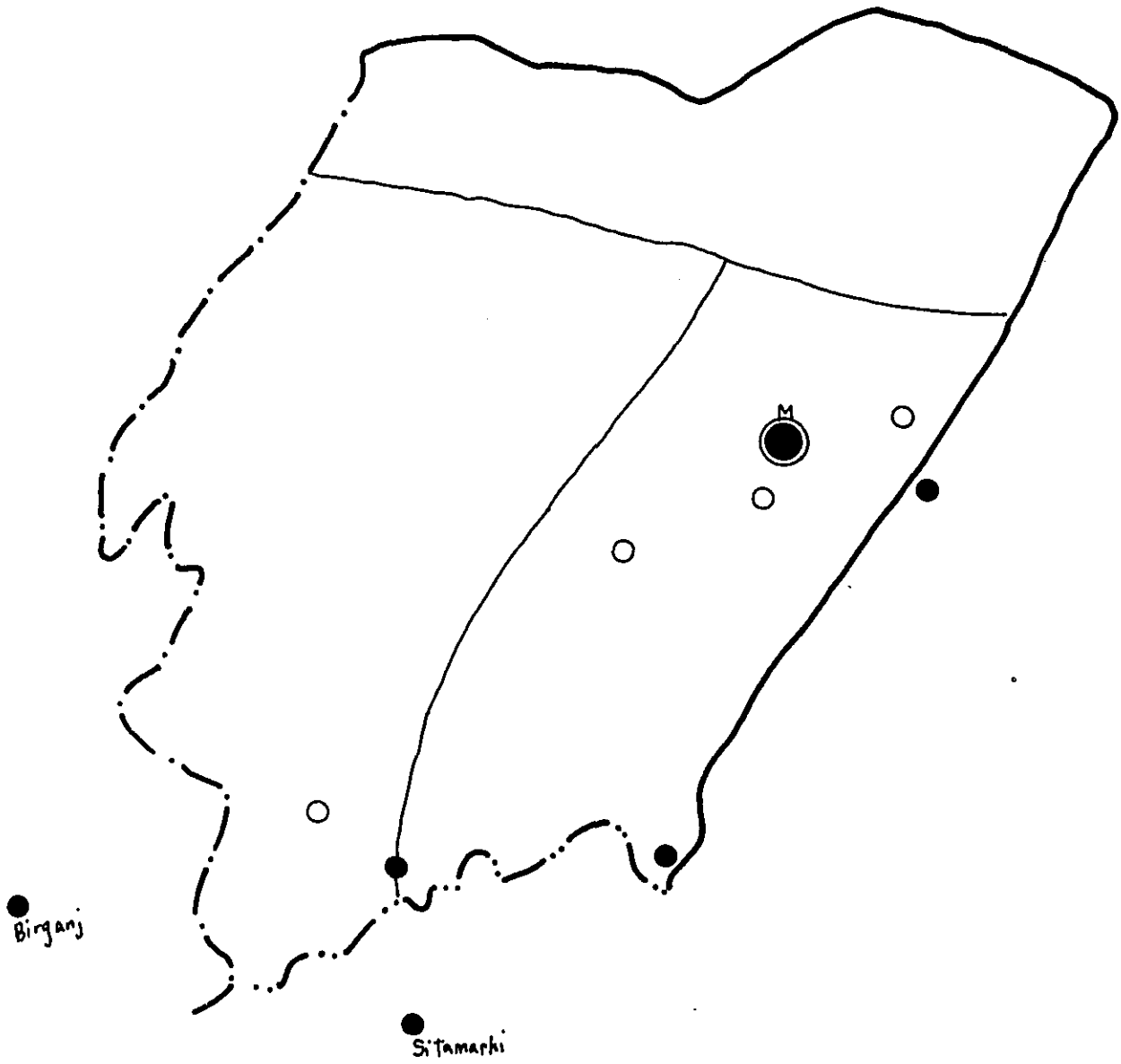


● Birganj

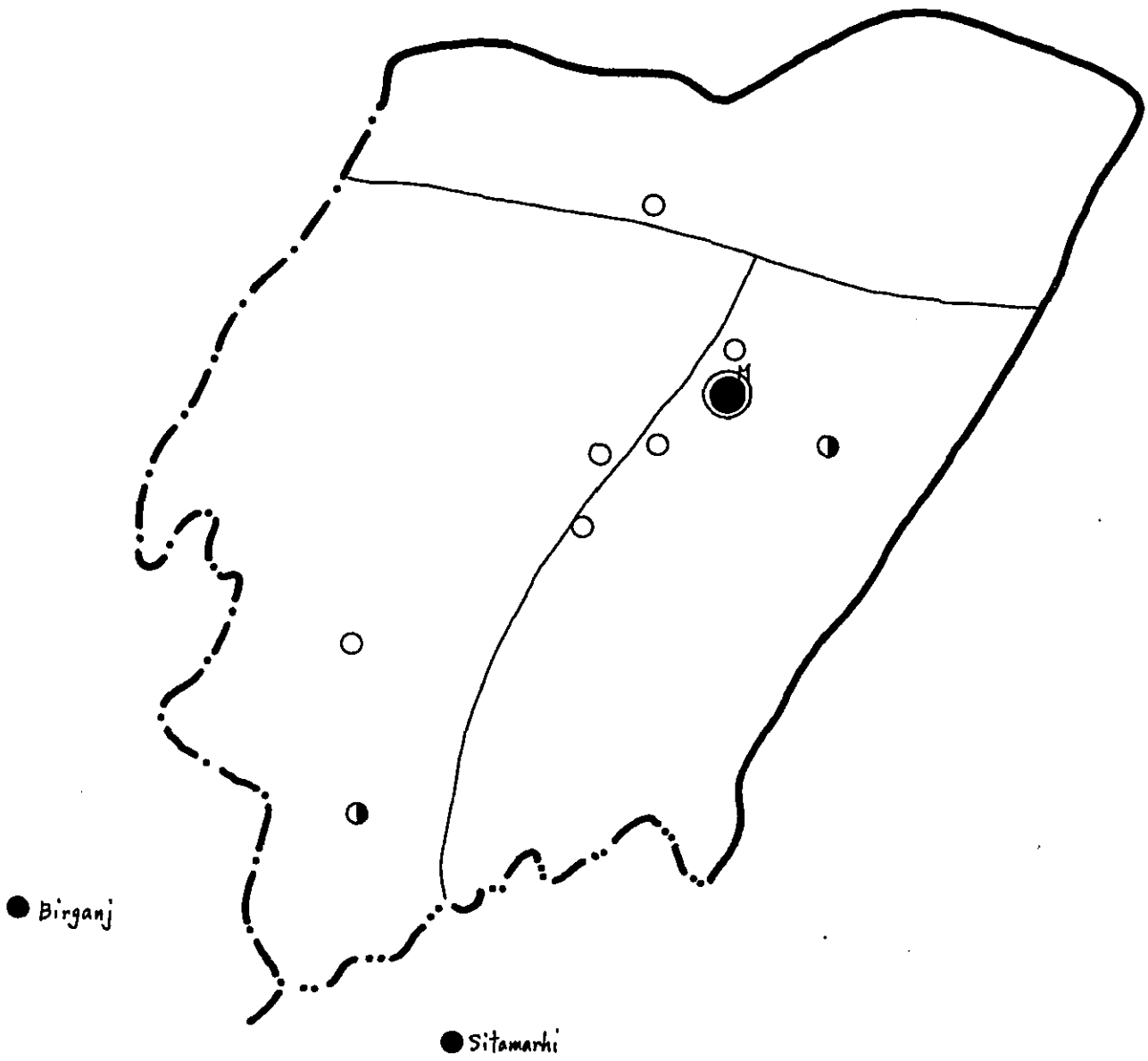
● Sitamarhi

● Janakpur

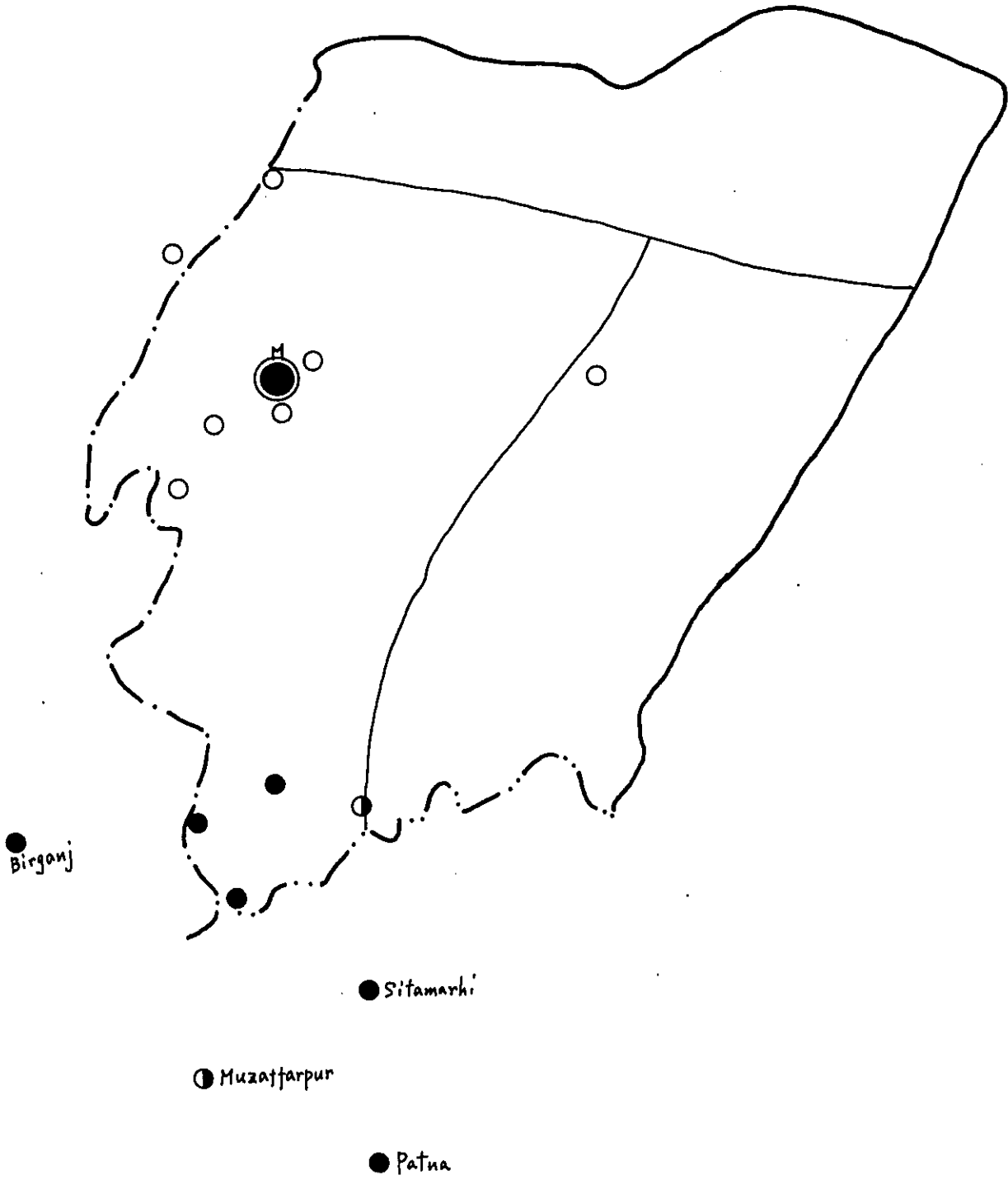
Mahendra Market



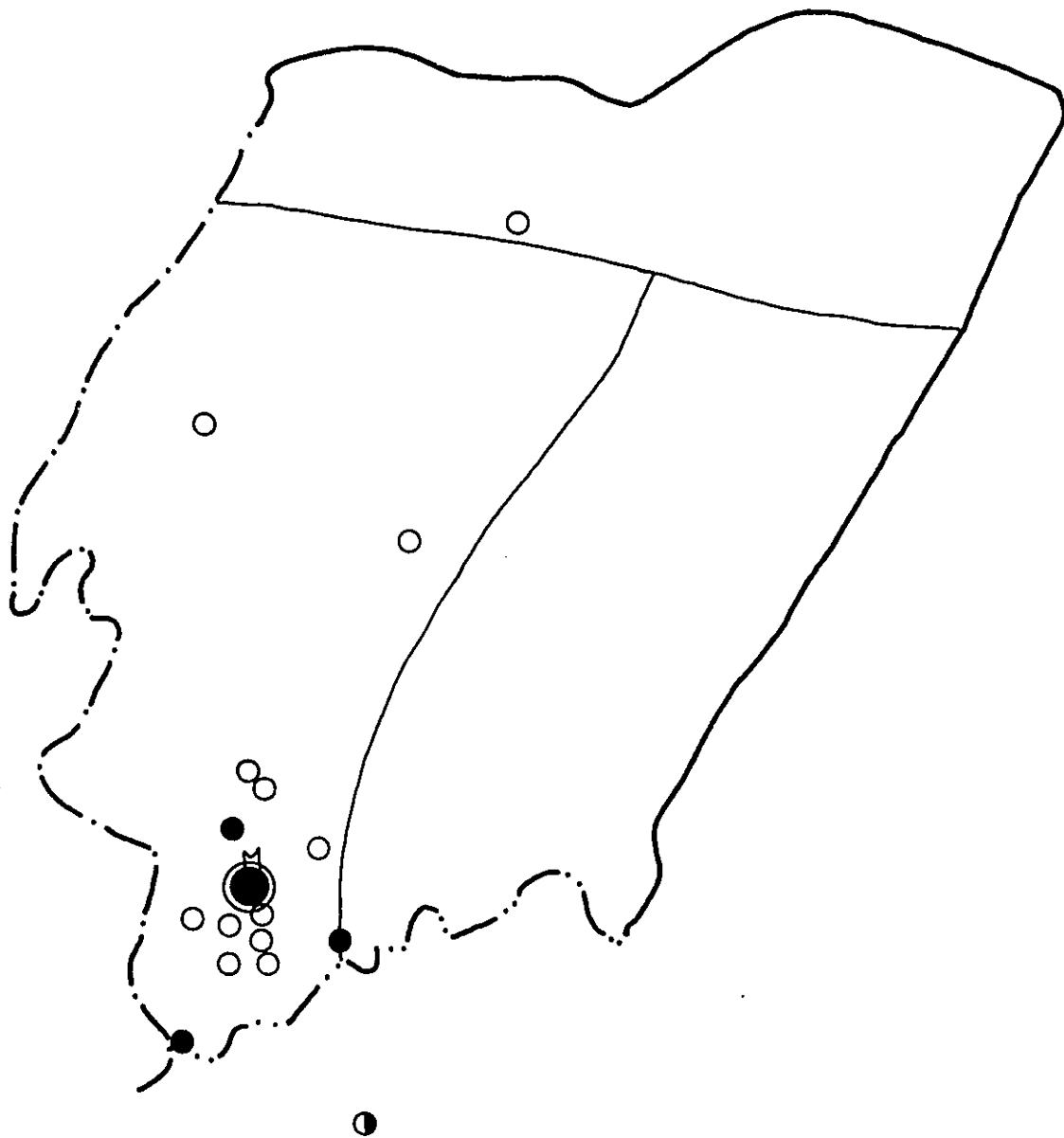
Hatiesar Harpur Market



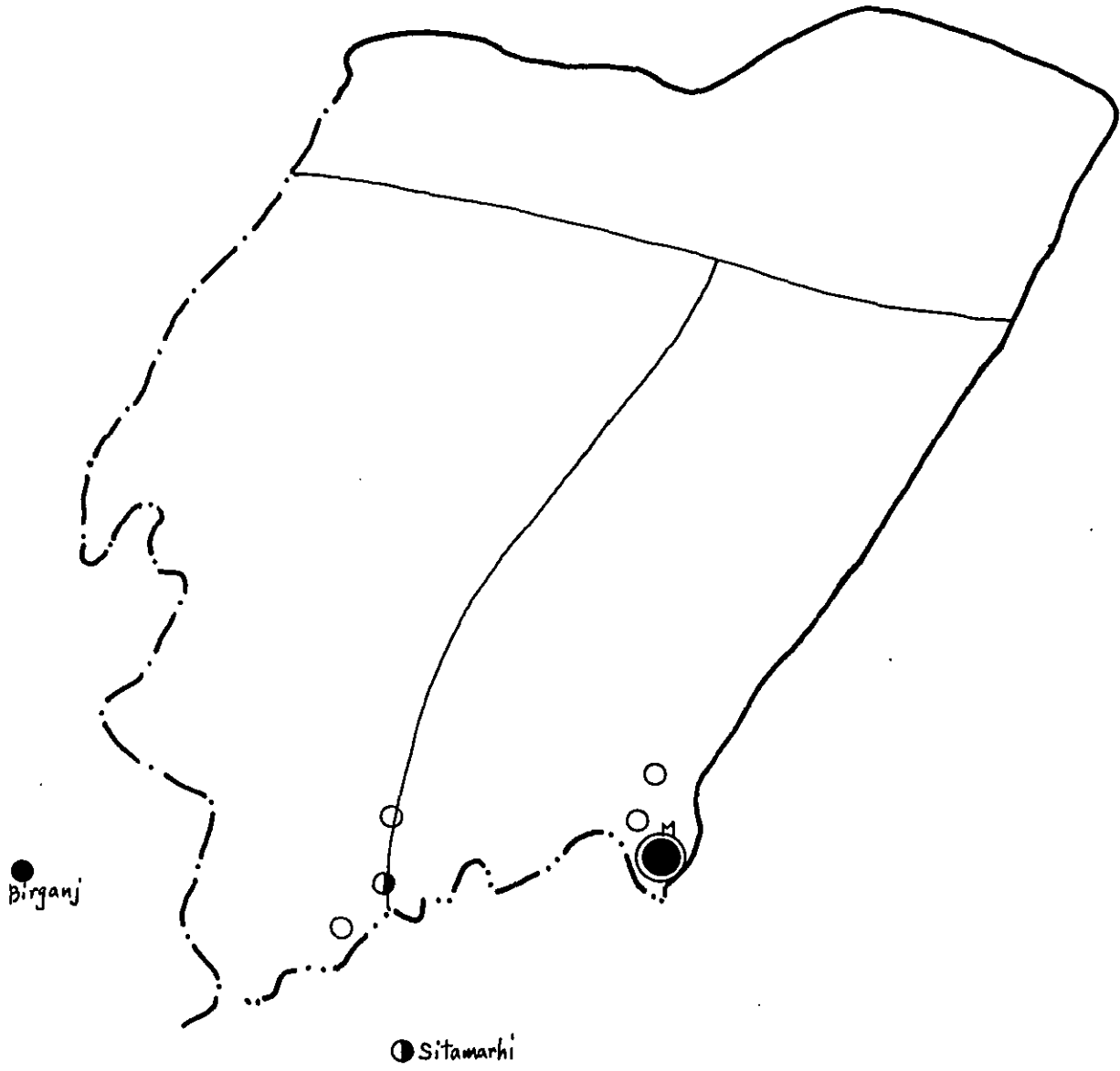
Barahathawa Market



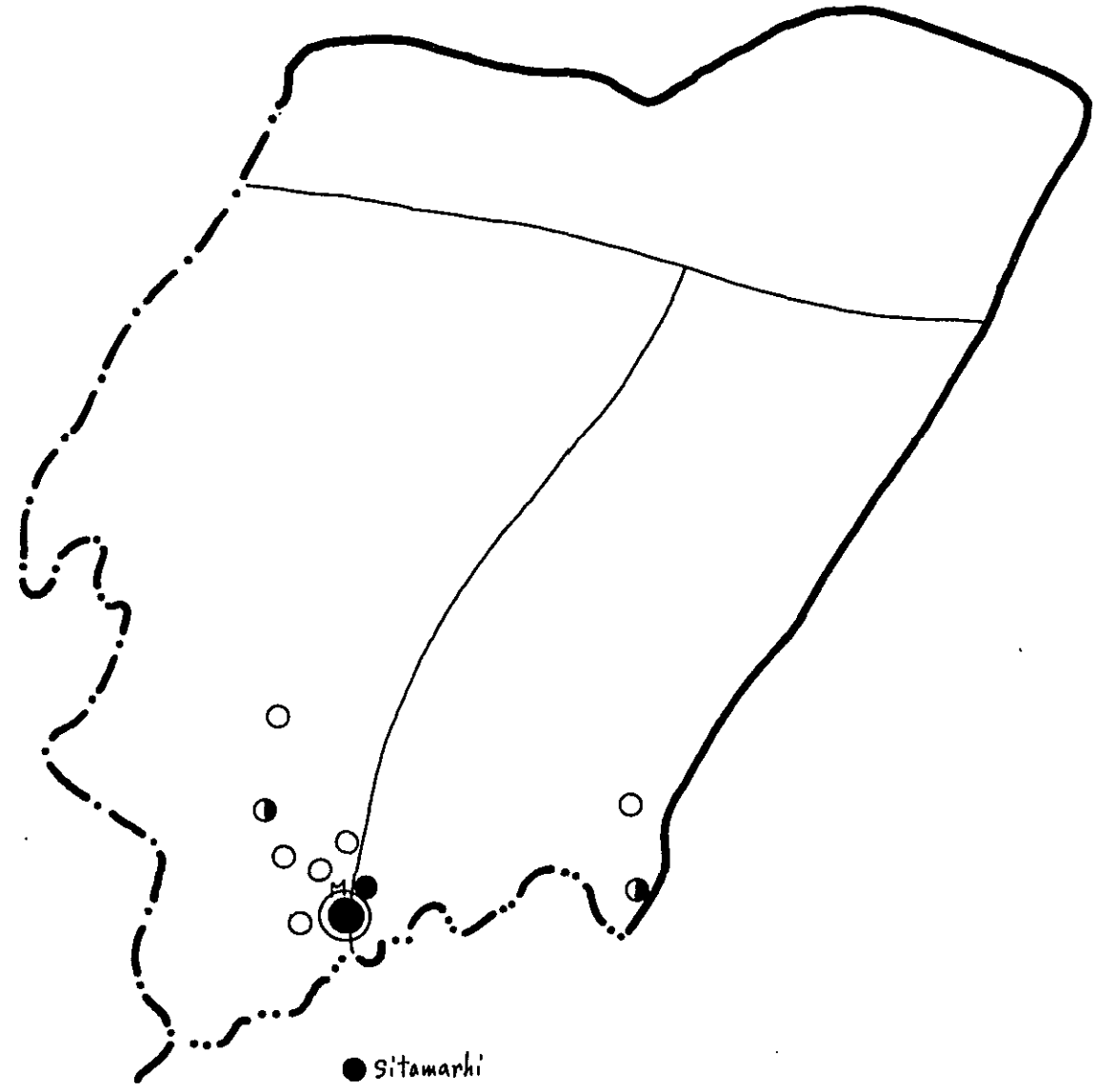
Sunderpur Market



Tribhuwan Market



Malangwa Market



● Sitamarhi

○ Motihari

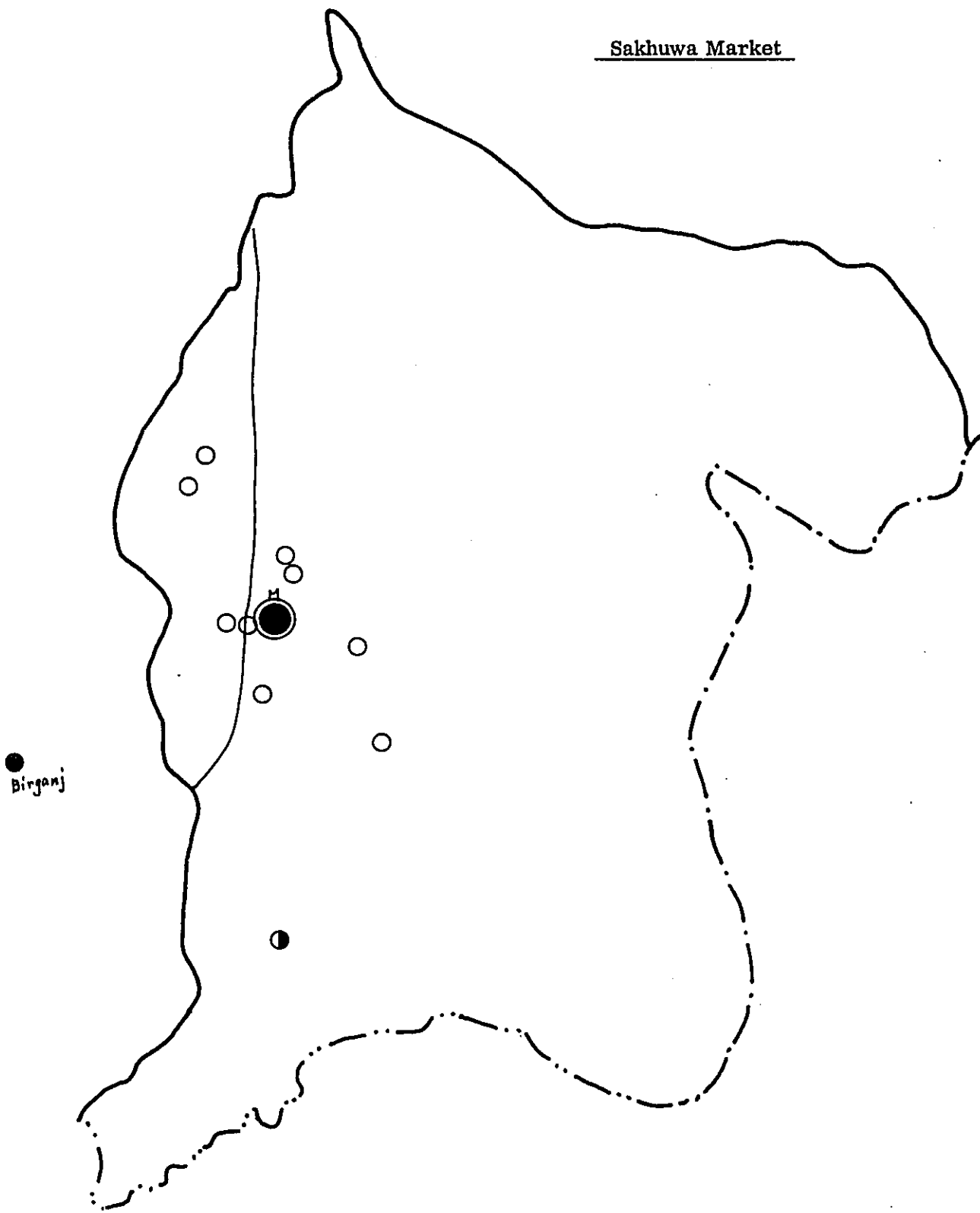
● Janakpur

Bharsar (Dharampur) Market



○Sitamarki

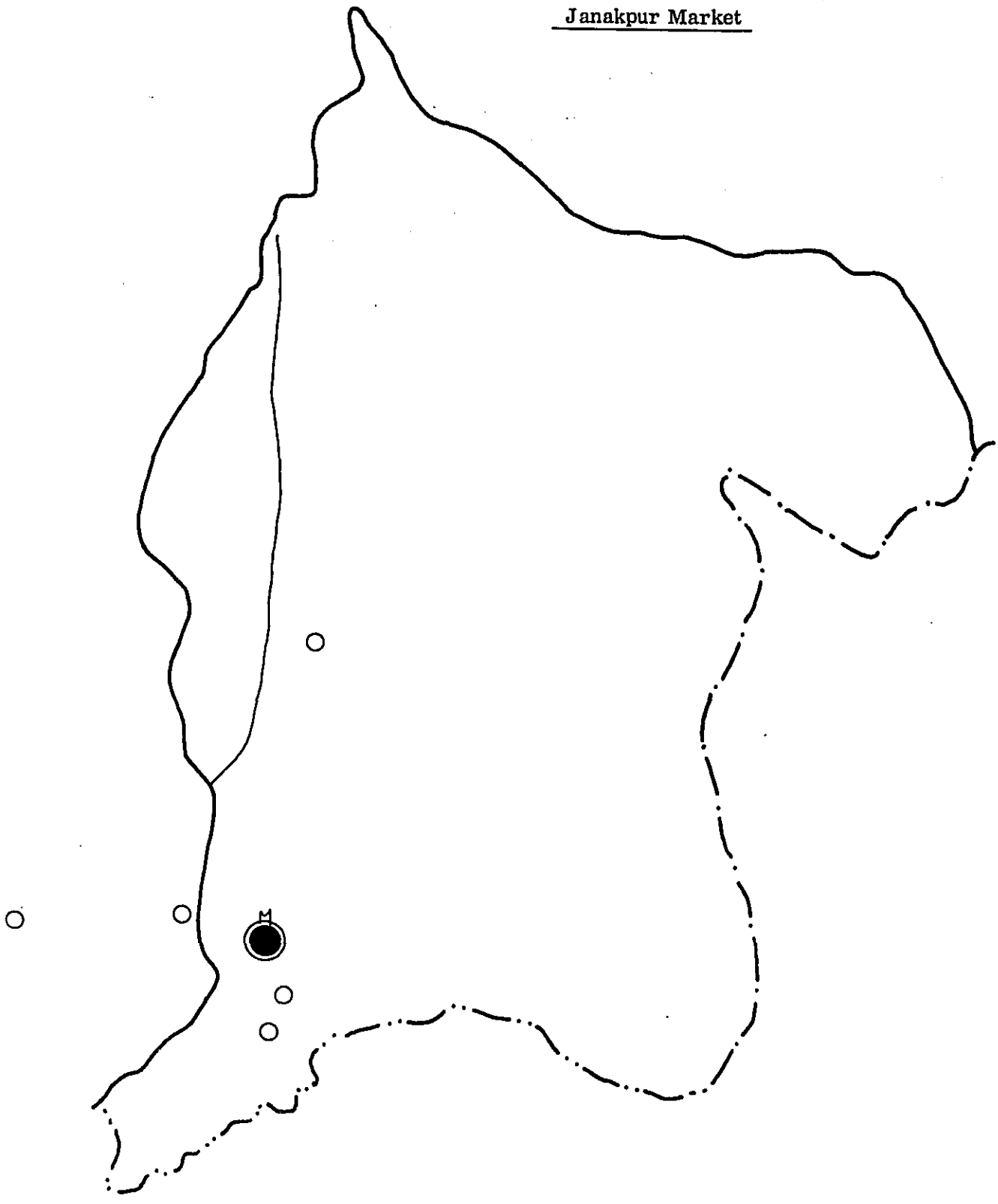
Sakhuwa Market



- Sitamarhi
- Muzaffarpur
- Bombay
- Patna

● Calcutta

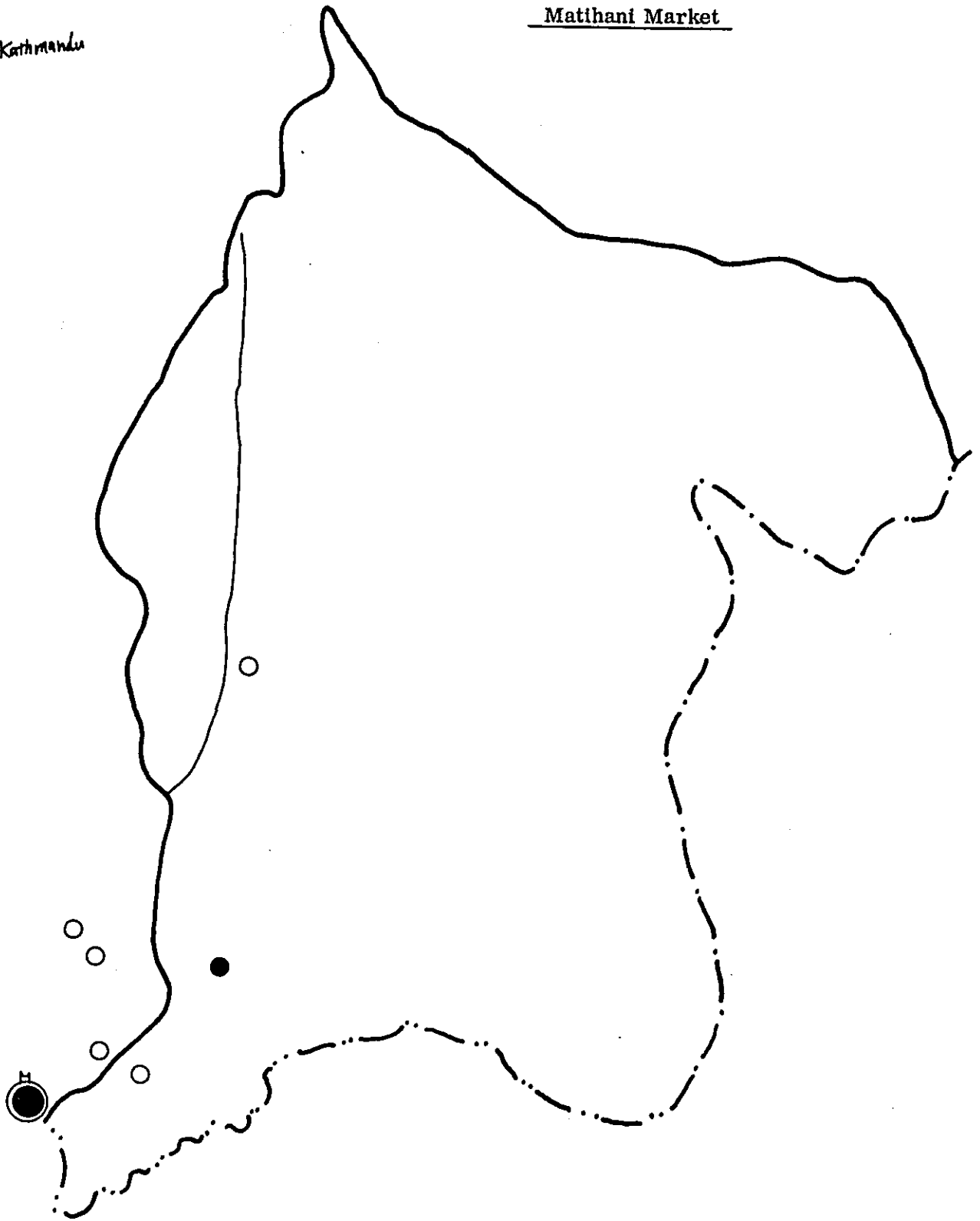
Janakpur Market



○ Chapra

Matihani Market

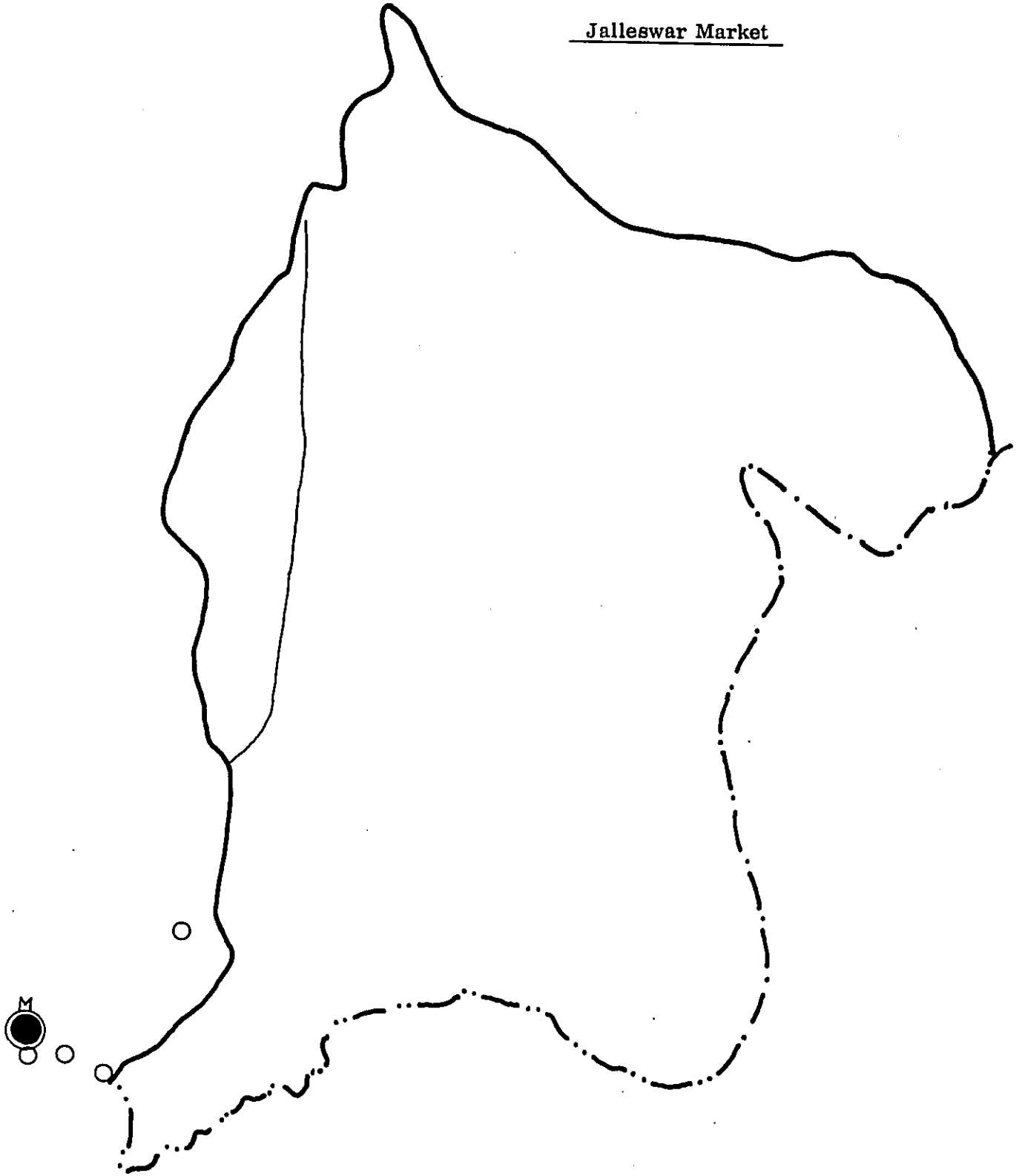
● Kathmandu



① Sitamarhi
● Muzaffarpur

○ Darbhanga

Jalleswar Market



○ sitamarhi

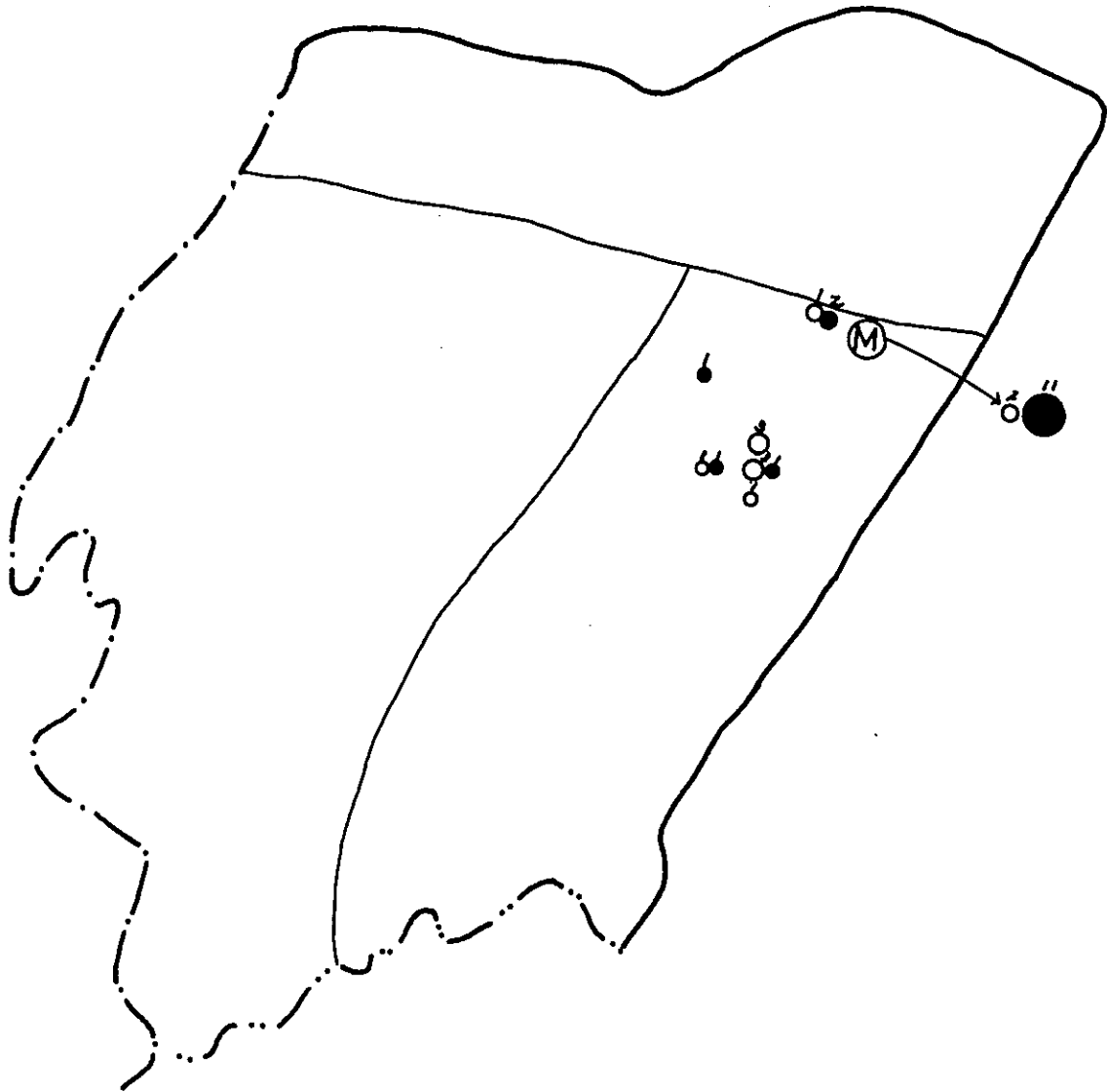
Fig. 7-4-2 Flow of Sellers and Purchasers

○ Flow of Sellers (Living Place)

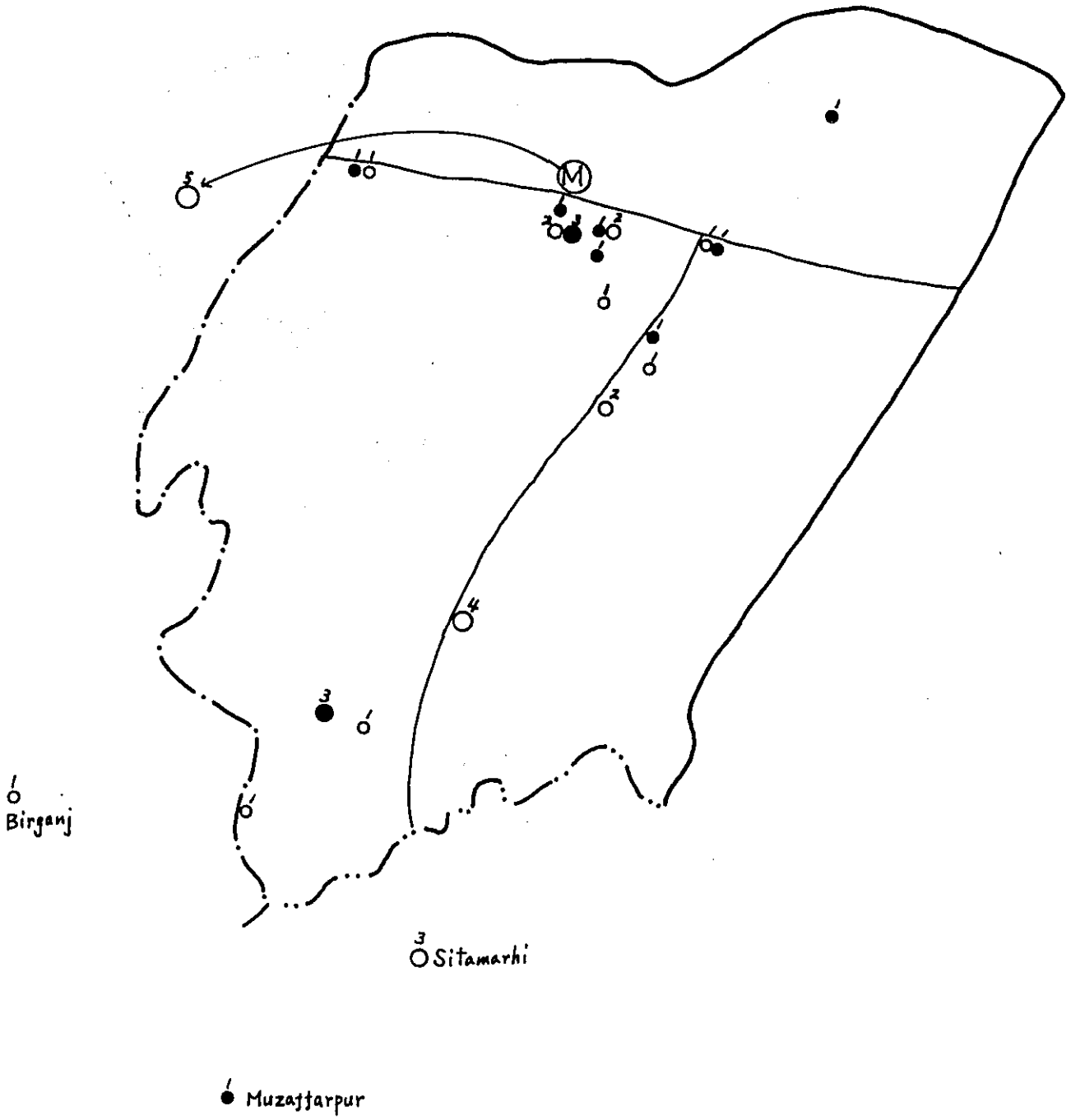
● Flow of Purchasers (Living Place)

No. : No. of Sellers or Purchasers

Ranigang Market



Harion Market

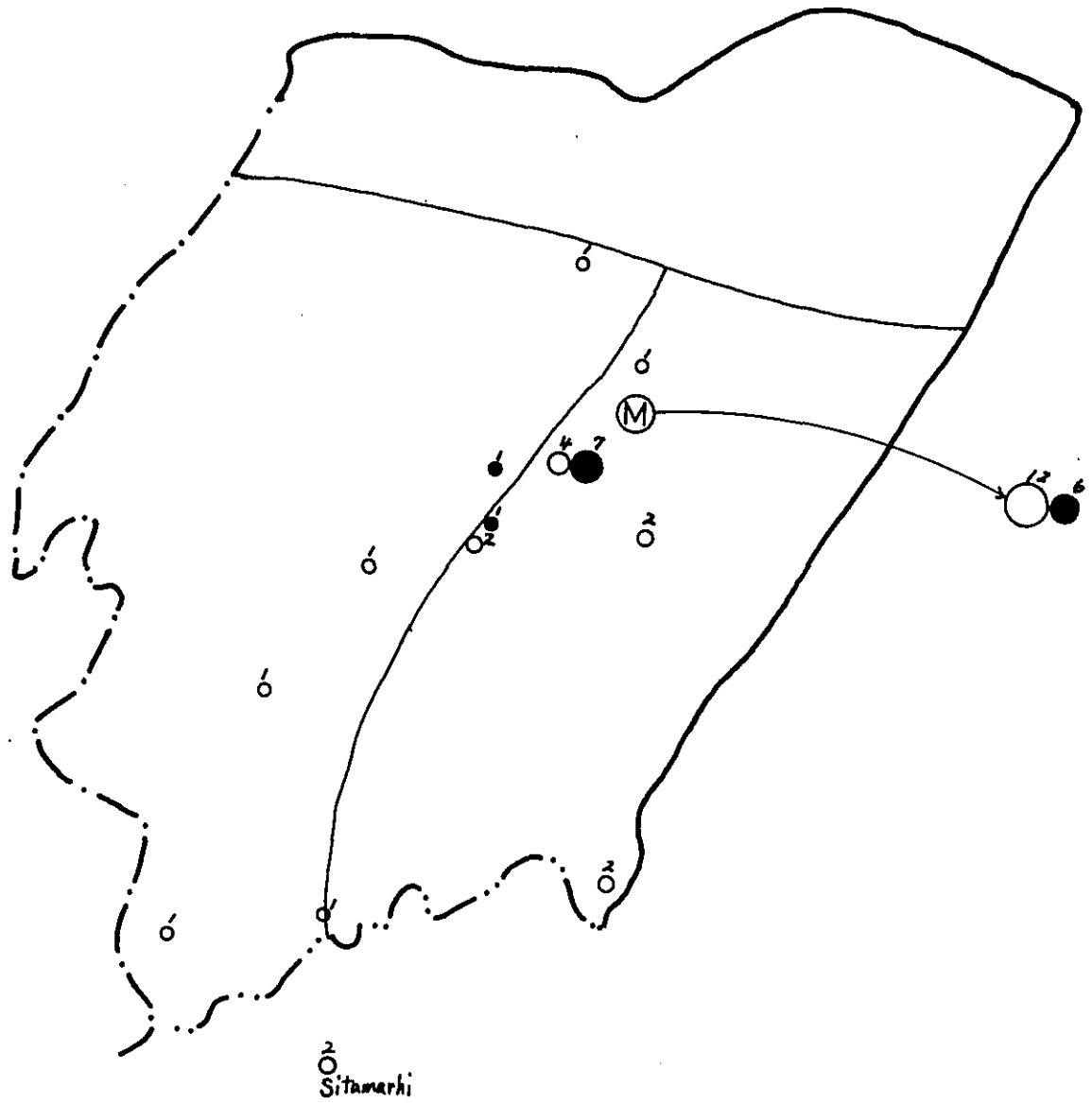


Mahendra Market

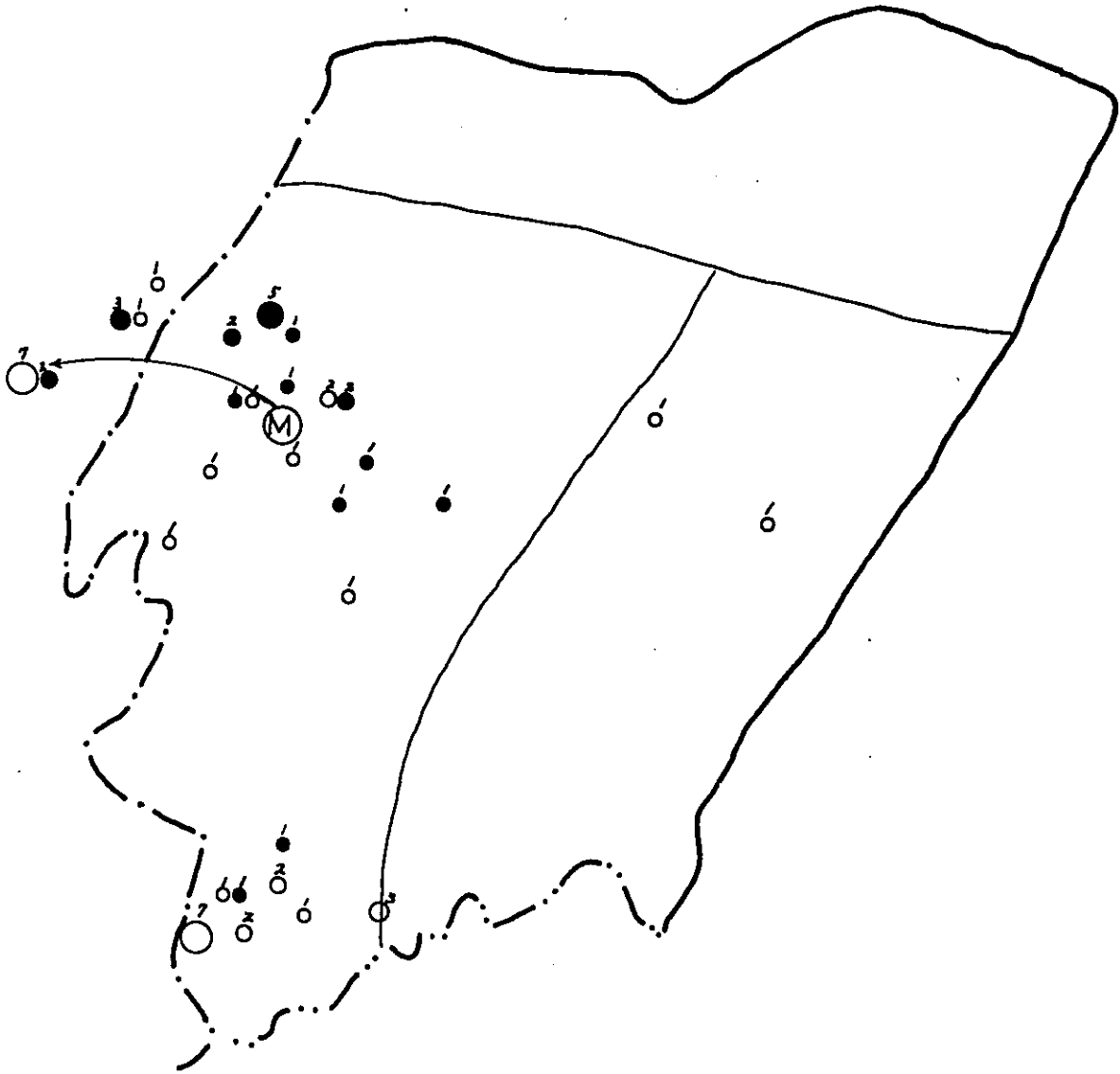


Janakpur

Hatiesar Harpur Market



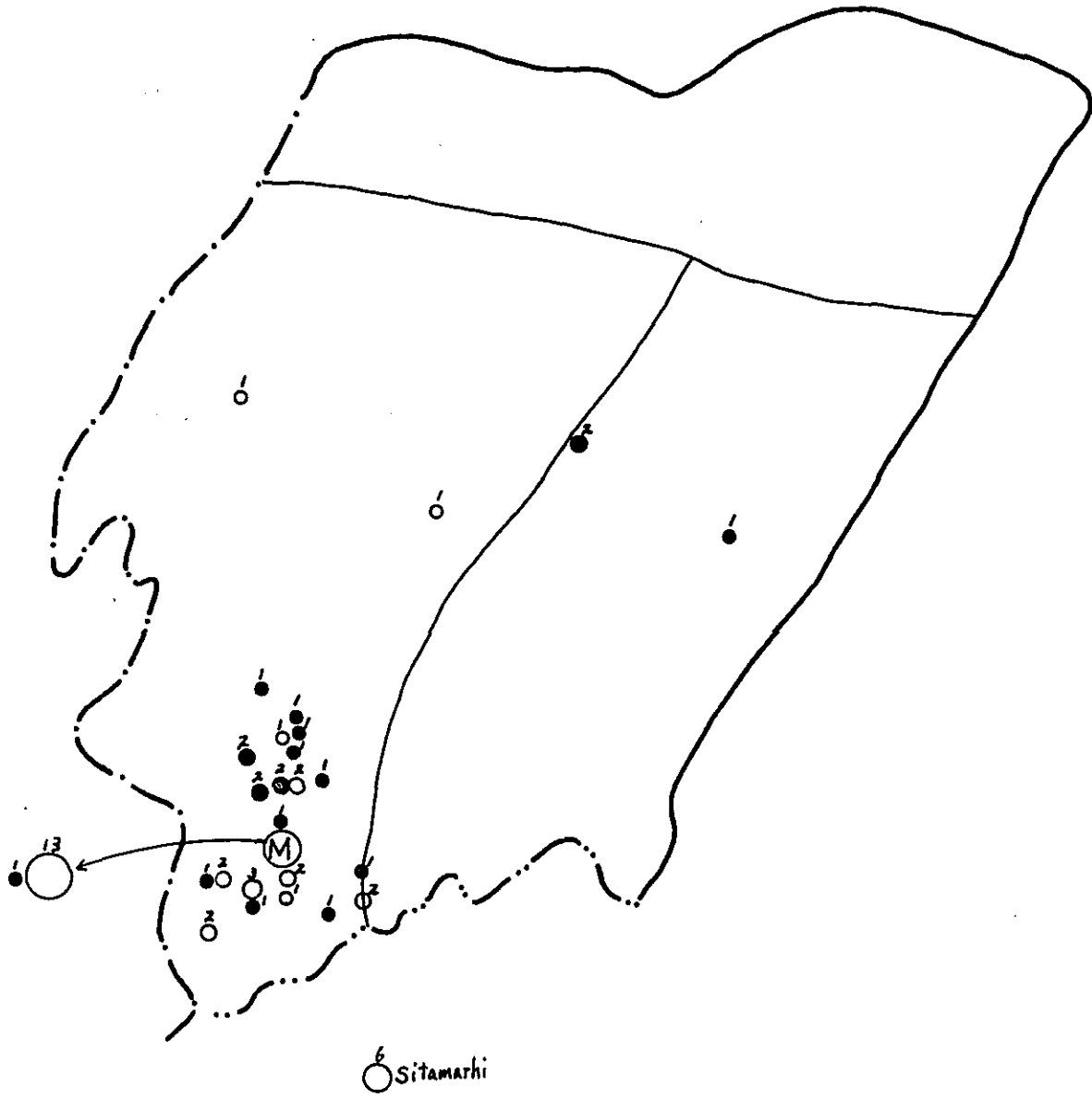
Barahathawa Market



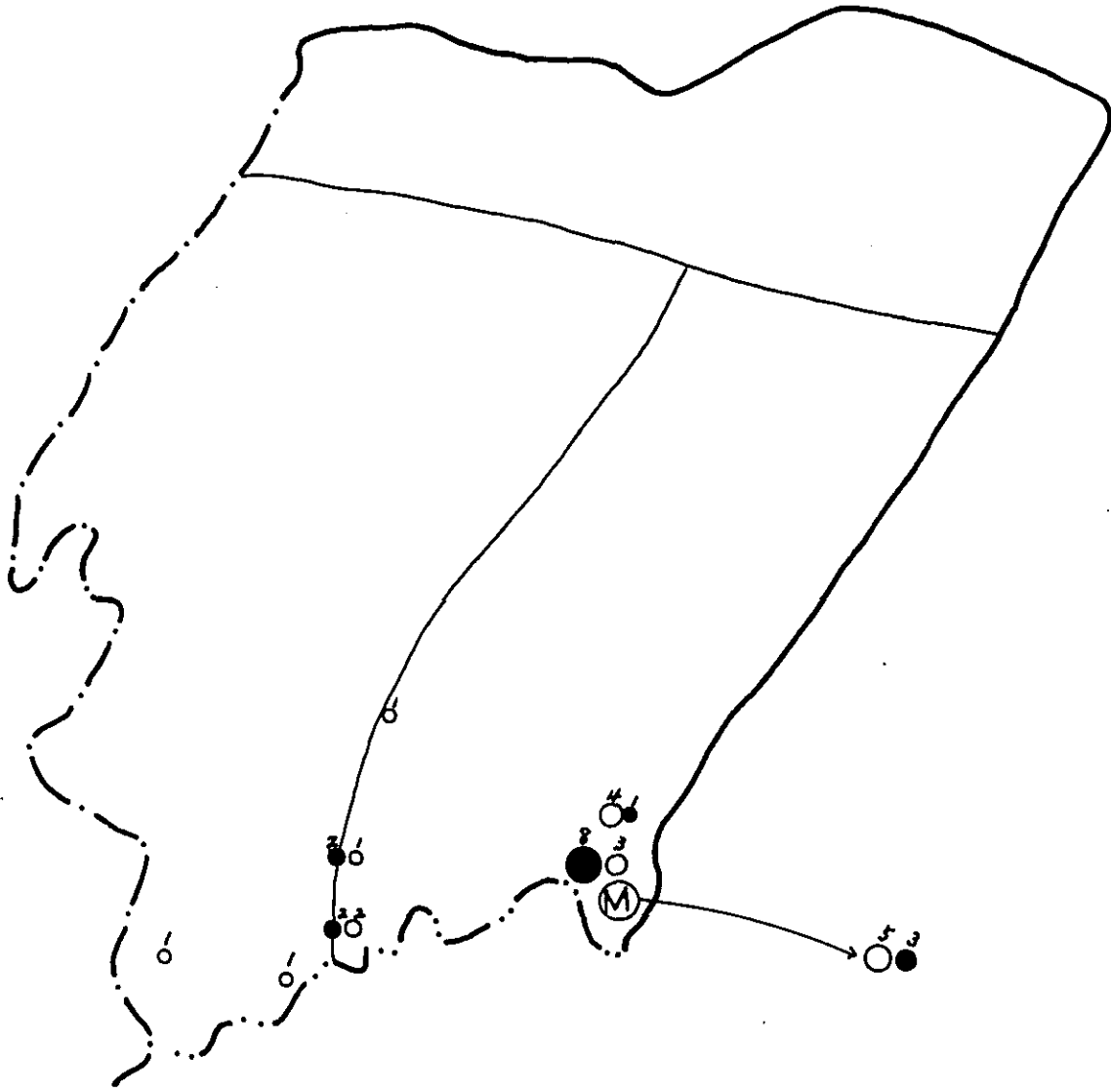
6 Sitamarhi

6 Muzaffarpur

Sunderpur Market

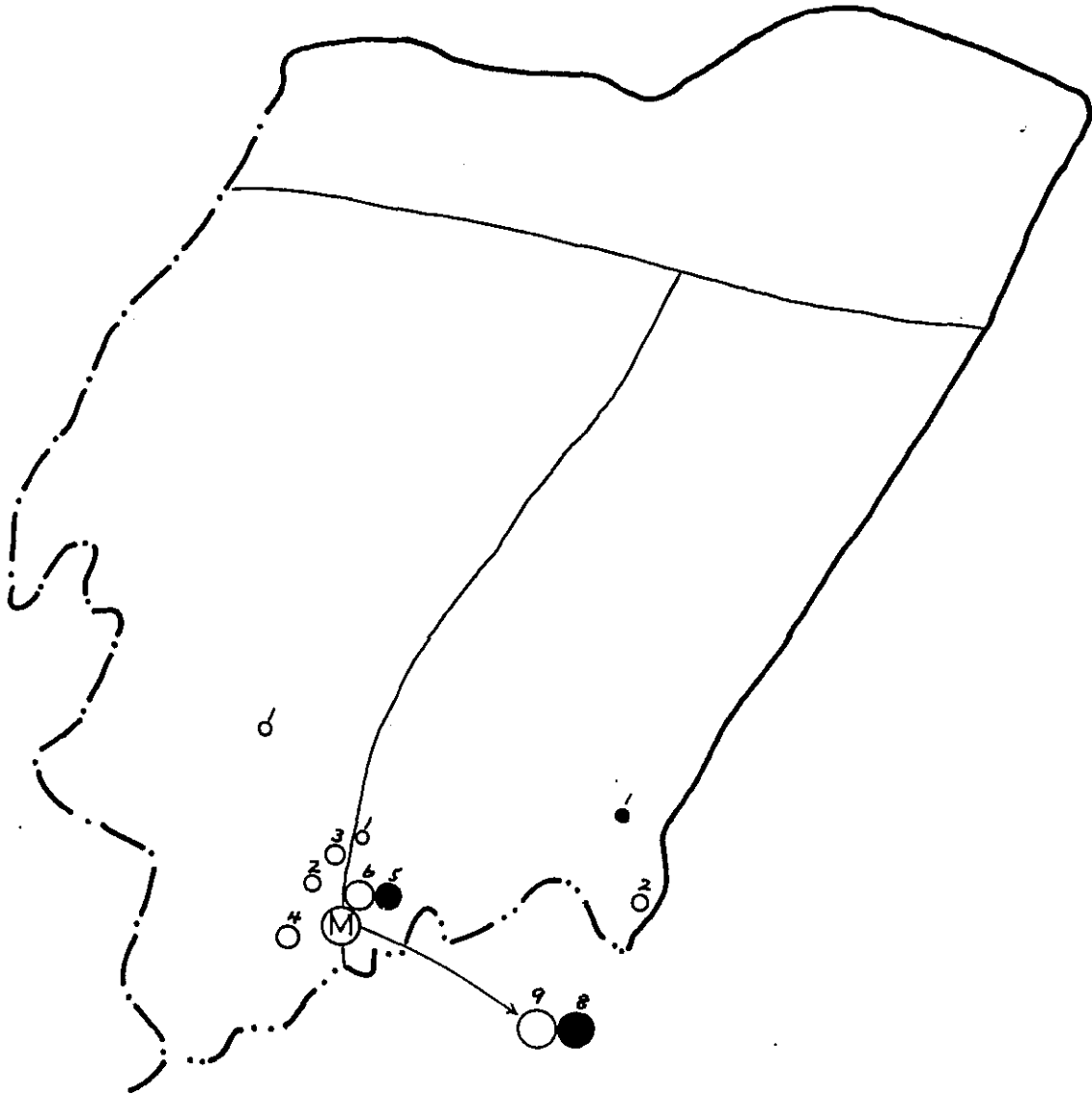


Tribhuvan Market



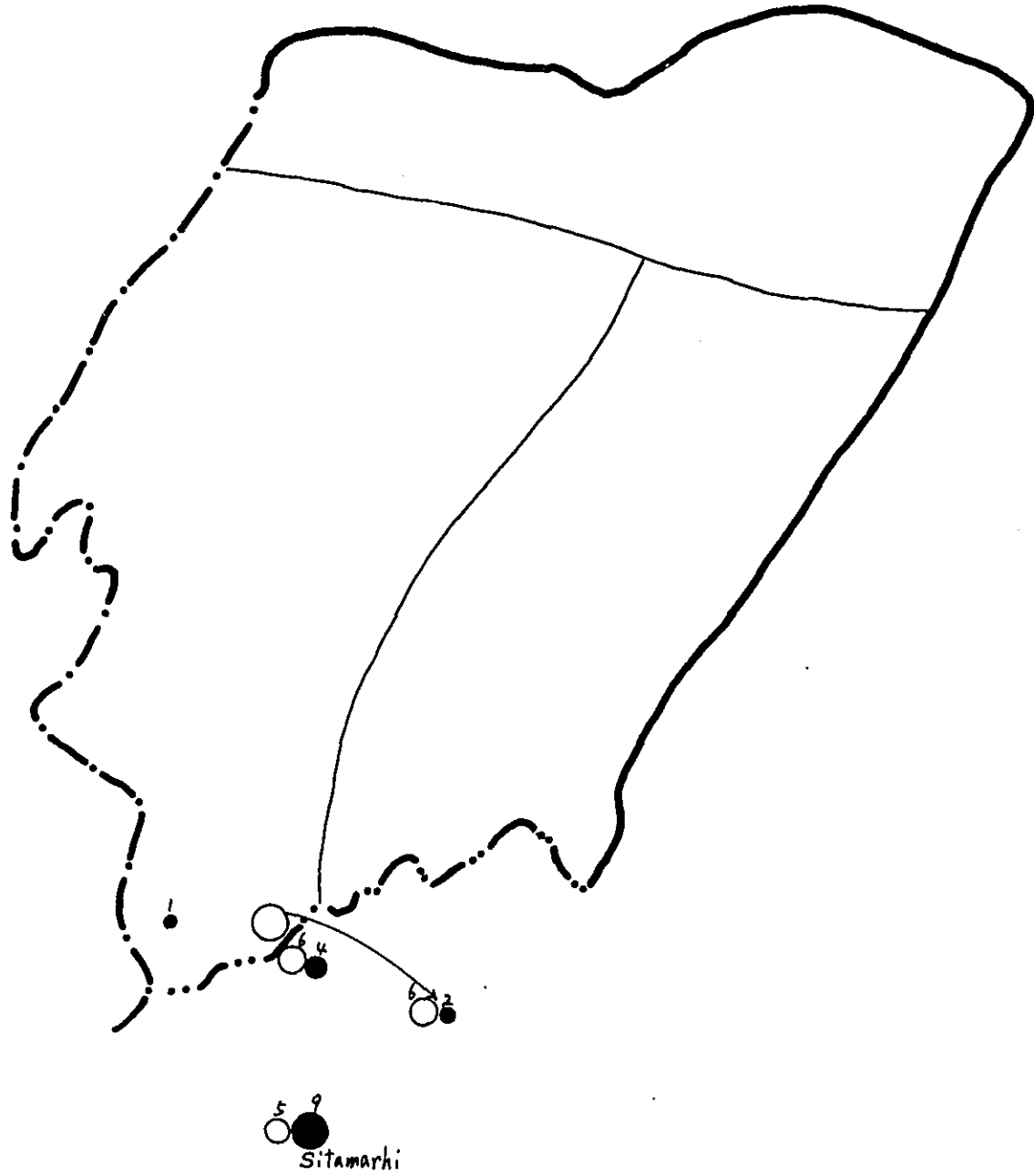
o Muzaffarpur

Malangwa Market

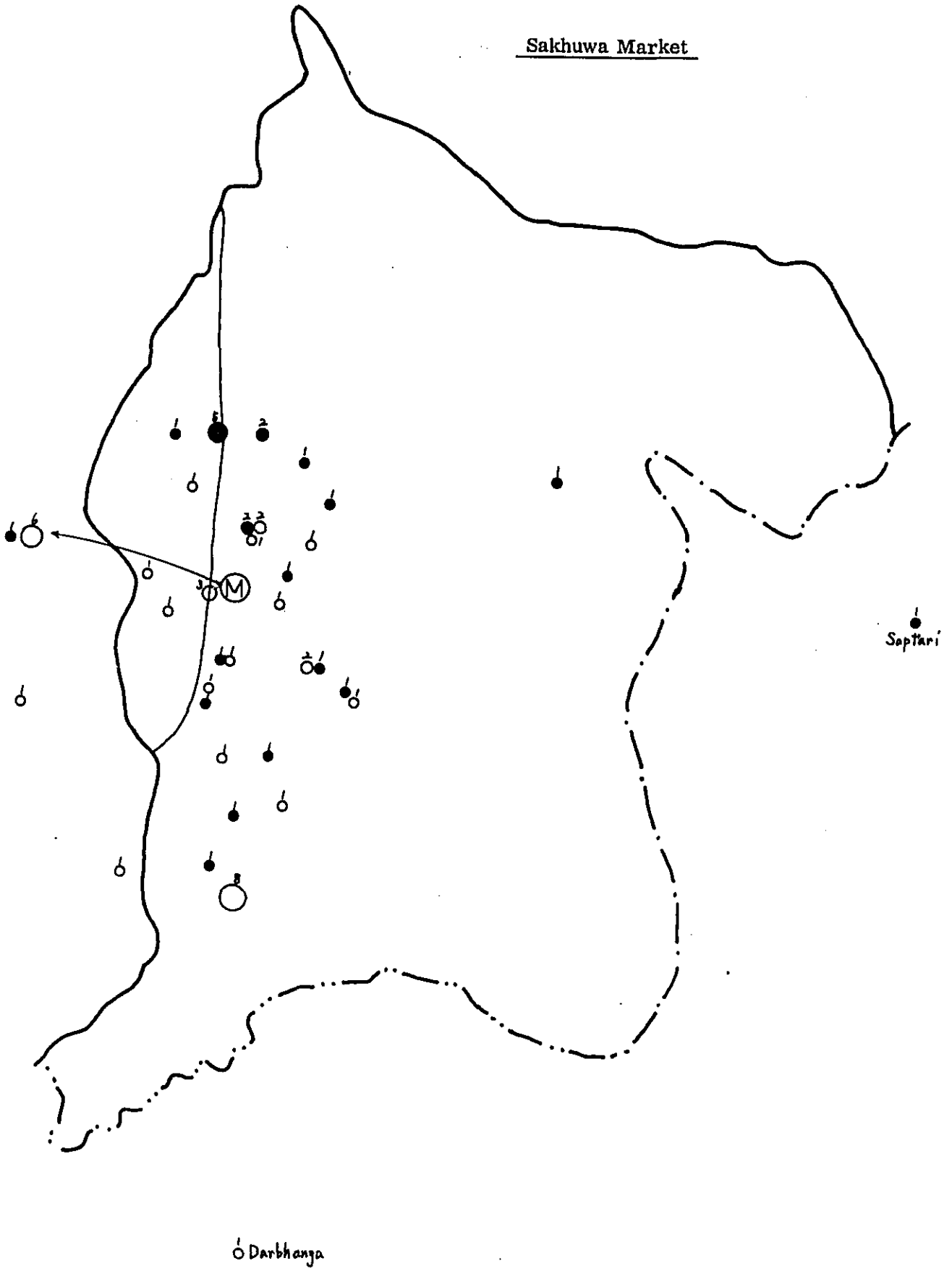


Janakpur
9

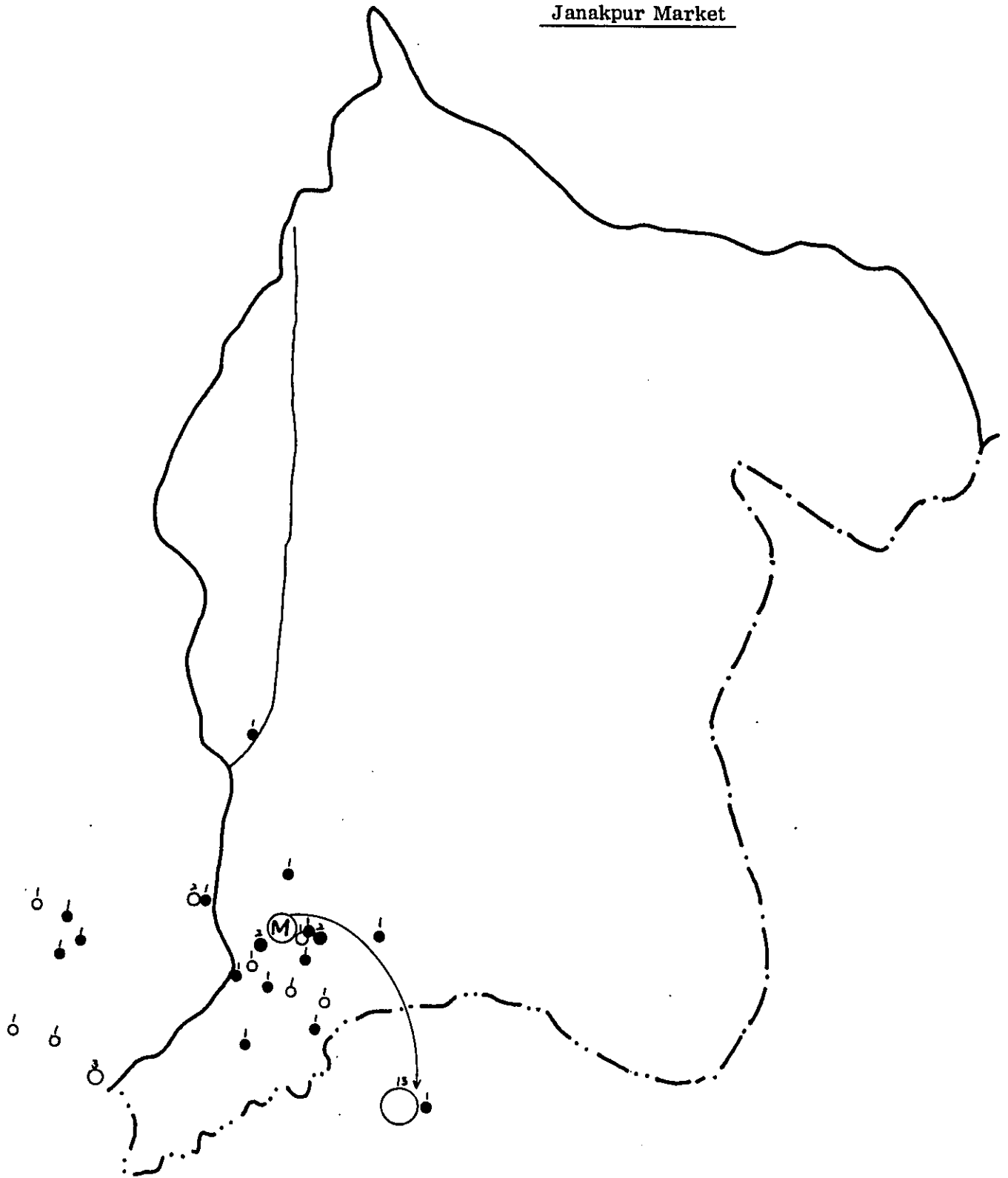
Bharsar (Dharampur) Market



Sakhuwa Market



Janakpur Market



ó Darbhanga

Jalleswar Market



