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TECHNICAL INTERVENTION REPORT

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Written by

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**TITLE : PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN
SOUTHEAST ASIA**

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1. Introduction

Aquaculture systems in peri-urban areas of Ho Chi Minh City (HCMC) are well known by concerned people for their popularity, diversity and significance to farmers livelihoods. However, under the investigation of the EC funded PAPUSSA project, these systems have received very little concerns from the City Authority. The results of the PAPUSSA project also illustrated that farmers involved in these systems are facing a number of difficulties. Out of many problems, the shortage and lack of access to technical knowledge is one of the most important to many of those growing both fish and aquatic plants in HCMC.

According to many studies such as PCA, baseline and monitoring survey (Papussa website www.papussa.org), it is very clearly shown that information on pond management is very scarce to farmers in most of the PAPUSSA studied communities. Therefore it is worth providing farmers with this type of knowledge so that it can help farmers to improve their production efficiency.

2. Methodology

A technical guide leaflet in the form of an annual calendar (see Appendix) was produced and distributed to farmers in 4 communities including Dong Thanh, Phong Phu, Da Phuoc and District 9 as a measured intervention strategy in order that its effect and impact could be monitored and its effectiveness as a practical, relatively low investment form of extension could be assessed. The step by step progress of the intervention study can be described in Figure 2.1.

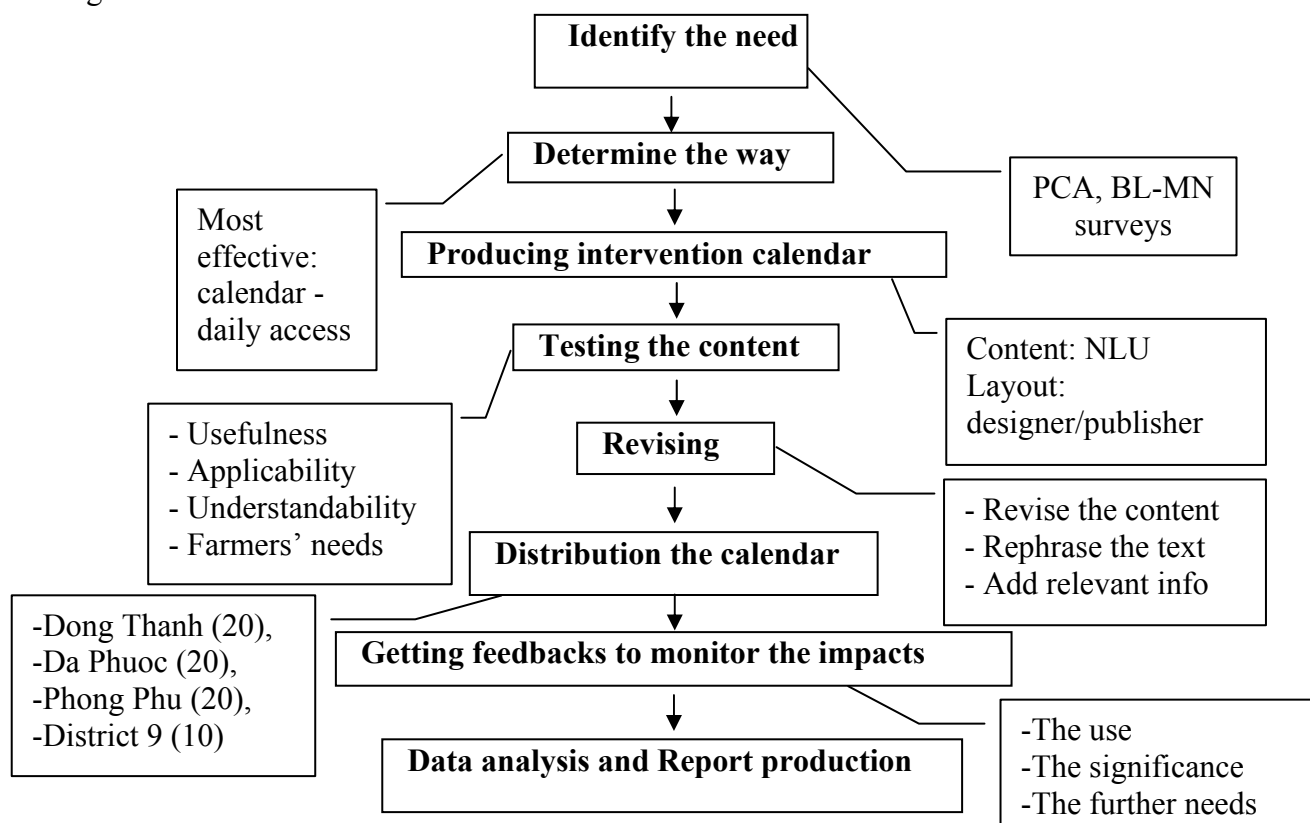


Figure 2.1 Conceptual framework of the intervention study

Based mainly on the findings from PCA studies and baseline and monitoring surveys, farmers needs on the technical knowledge in pond preparation and management were definitely identified although the importance of this type of information varied amongst the study communities chosen. Among many methods to display and disseminate information, an annual calendar was considered to be innovative and effective since farmers can access information daily on the calendar in the house which is always placed visibly available for them. This ensured the availability of information to farmers and also avoided the possibility that farmers threw away the provided aids which quite often happened in the past. Also the calendar could often act as starting point in conversations and discussions when other fish farming neighbours visited the house.

The content of the leaflet was made by the PAPUSSA team in UAF while design of the calendar was assigned to a professional designer who then incorporated the content together into the calendar. Before a final version was made, the technical information of the leaflet was piloted with farmers in order to assess if the content of the leaflet was firstly accurate and then useful, applicable, understandable and suitable to farmers. This information collected from the piloting step was then incorporated accordingly to produce a final version of the intervention calendar.

The remaining steps were then to distribute the calendars to farmers, which were conducted during December 2005 and January 2006 in 4 communities, including Dong Thanh, Phong Phu, Da Phuoc and District 9. The impacts were then monitored by a feed back survey with structured questionnaires (see appendix), which was aimed to check the usefulness, the significance of the calendar to farmers. Also, farmers further needs on technical information were gathered. This step was done during February and March 2006.

3. Results

Table 1 Types of aquatic production systems involved in the intervention study-

Polyculture is the main feature of fish culture in integrated systems, in which farmers use animal manures as a main input. So the term “polyculture” alone means that the fish pond is culturing many species to utilize natural feed but it is not fertilized with animal manure.

Communities	Distance from city centre (km)	Production systems (%)			
		Fish seed	Integrated system	Monoculture	Polyculture
Da Phuoc	20	10.00	30.00	20.00	40.00
District 9	15	0.00	37.50	0.00	62.50
Dong Thanh	17	0.00	0.00	85.71	14.29
Phong Phu	17	7.69	15.38	15.38	61.54

Table 1 shows that different types of aquatic production systems were sampled in different communities to obtain the representation of overall pattern of production systems. Integrated systems and polyculture were involved in District 9 samples as these are common systems in this district. Phong Phu and Da Phuoc communes have the most diverse types of fish farming

systems, out of which polyculture is the most popular. In contrast, monoculture is the representative system in Dong Thanh commune. All these popular systems require quite good management practices for better production while farmers receive very limited technical information from any sources.

From our intervention study survey, a very high proportion (more than 70%) of farmers involved in the study at Da Phuoc, Phong Phu and District 9 stated that they have never received any technical information (Table 2). The exception and contrast to this can be easily be seen in Dong Thanh where more than 85% of farmers claimed to have received technical support. This indicates that fish farmers in Dong Thanh commune have better access to technical information than farmers in other communes. The concerns and interest of local government in different communes could be a good explanation for this distinction. The reason for the best access to technical information for farmers in Dong Thanh may be the concerns of local government. Hoc Mon extension station plays very active roles in helping farmers to deal with technical difficulties. In order to do so, extension workers are very regularly visiting and giving advice to farmers.

Table 2 Previous accessibility of farmers to technical information

Community	No		Yes	
	N	%	N	%
Da Phuoc	14	70.00	6	30.00
District 9	6	75.00	2	25.00
Dong Thanh	1	14.29	6	85.71
Phong Phu	9	69.23	4	30.77

Farmers in different communities obtain their technical information (if any) from different sources (Table 3). While the Farmers Union plays an important role in information distribution in Da Phuoc and Phong Phu communes, the Agriculture Extension Centre is the most important source of technical information in District 9 and Dong Thanh commune. In fact, about 66.7% and 75% farmers in Da Phuoc and Phong Phu respectively have been delivered a leaflet with similar content to the leaflet used in this study which was provided by the Farmers Union. Though aquaculture drugs and aquafeed companies are not the main source of technical information for farmers in peri-urban aquaculture, they do play certain roles in information provision to farmers.

Table 3 Previous information providers

Providers	Communities (%)			
	Da Phuoc	District 9	Dong Thanh	Phong Phu
Aquaculture drugs companies	16.67	0.00	0.00	0.00
Aquafeed companies	16.67	0.00	0.00	0.00
Extension centre	0.00	100.00	100.00	25.00
Farmers Union	66.67	0.00	0.00	75.00

Table 4 shows that fish culture techniques are a popular topic for extension leaflets received by farmers in District 9, Dong Thanh and Phong Phu communes. Farmers in Dong Thanh recently got the recommendation from the extension service to develop frog culture. This can be the reason why more than 42% of farmers in Dong Thanh confirmed to receive leaflets on frog culture techniques. The data shows that the content of the calendar used in the study is an innovative form of information dissemination which farmers have ever seldom accessed.

Table 4 Content of the received leaflets

Information provided	Communities			
	Da Phuoc	District 9	Dong Thanh	Phong Phu
Feeding of fish	10.00	0.00	0.00	0.00
Fish culture	5.00	12.50	42.86	30.77
Fish disease treatment	10.00	0.00	0.00	0.00
Frog culture	0.00	0.00	42.86	0.00
No leaflet received	75.00	87.50	14.29	69.23

When asked if they have received any technical fact sheet in any similar form as the PAPUSSA one, 100% of farmers confirmed that they never received any similar leaflet. This could prove the significance of the leaflet in terms of its attraction to farmers, thus its intervention relevance is predictable.

Table 5 Farmers' understanding levels

Communities	Levels of understanding (%)		
	Fully understand	Not understand at all	Partially understand
Da Phuoc	75.00	5.00	20.00
District 9	25.00	0.00	75.00
Dong Thanh	57.14	0.00	42.86
Phong Phu	46.15	0.00	53.85

Regarding the level at which farmers could understand the leaflet, Table 5 illustrates the differences between studied communities. None of the farmers in District 9, Dong Thanh and Phong Phu communes were unable to understand the leaflet whilst the figure in Da Phuoc is 5%. These figures prove that the PAPUSSA intervention calendar will definitely contribute to farmers technical knowledge at some level. Indeed, a very high proportion of farmers (75%) in Da Phuoc could fully understand the content while only 20% only partially understood.

Farmers understanding levels are quite different in different communities. While most of farmers in Da Phuoc could fully understand the fact sheet, most of farmers in District 9 (75%) could only partially understand. In Dong Thanh and Phong Phu, the percentage of farmers that fully and partially understood the contents of the calendar are about equal. However,

farmers in Dong Thanh seems to better understand than farmers in Phong Phu as Dong Thanh has a little higher percentage of farmers categorized in the fully understanding level.

Table 6 Firstly applicable technique used by farmers after reading the leaflet

Community	Count	Stocking fingerlings		Pond preparation		Management technique		Feeding fish	
		N	%	N	%	N	%	N	%
Dong Thanh	7	7	100.00	0	0.00	0	0.00	0	0.00
Da Phuoc	20	3	15.00	2	10.00	12	60.00	4	20.00
Phong Phu	13	5	38.46	4	30.77	3	23.08	3	23.08
District 9	8	7	87.50	3	37.50	4	50.00	1	12.50

The significance of sections of the information offered in the calendar varied between the different studied communities. This can be seen as the applicability of each part to individual farmers. Table 6 shows that techniques for stocking fish were highly applicable to farmers in Dong Thanh which means that the PAPUSSA intervention leaflet contributed a significant and valuable technical knowledge to farmers in this community. Conversely, fish pond management techniques are quite important to farmers in Da Phuoc commune with 60% of farmers after reading the calendar applying this technique first to improve their production. The other three remaining parts received the same level of farmers' concerns. In Phong Phu commune, all 4 parts have the same significance level to farmers with about equal share to be the first application of farmers. Techniques for stocking fingerlings and fish pond management are the two first applicable techniques for most of farmers in District 9 with up to 87% and 50% of farmers respectively firstly applying fingerling stocking techniques and fish pond management techniques in their fish culture practices.

Table 7 The helpfulness of the leaflet

Community	Count	Improve production		Reduce mortality		Reduce cost		Enhance productivity	
		N	%	N	%	N	%	N	%
Dong Thanh	7	2	28.57	2	28.57	0	0.00	3	42.86
Da Phuoc	20	7	35.00	5	25.00	4	20.00	9	45.00
Phong Phu	13	4	30.77	6	46.15	1	7.69	4	30.77
District 9	8	5	62.50	1	12.50	1	12.50	6	75.00

Table 7 describes how the intervention calendar is helpful to farmers in their perceptions. Data shows that farmers' perceptions on the helpfulness of the calendar are quite diverse among studied communities. In Dong Thanh, about 43% of farmers, which is the highest proportion, perceived that application of techniques provided in the calendar will enhance their fish pond productivity. Improvement of production and reduction of fish mortality are also a potential areas of help from the leaflet for Dong Thanh farmers.

In District 9, both improvement of production and enhancement of productivity voted by the highest percentage of farmers (63% and 75% respectively) to be the most helpful for farmers when they apply technical information provided in the leaflet.

Despite this there were some dissimilar ideas, quite similar thoughts of the significance of PAPUSSA intervention calendar were observed in Phong Phu and Da Phuoc communes. Most farmers in Da Phuoc and Phong Phu thought that they could get benefit from production improvement and productivity enhancement. However, reduction of fish mortality was most significant for farmers in Da Phuoc with the highest percentage of farmers while the most significant helpfulness for farmers in Phong Phu was productivity enhancement with the highest proportion of 45% farmers.

In summary, the data illustrated that significances of the intervention calendar according to the recipient farmers perceptions are quite general. One of the limitations of this particular intervention study was that and there was not enough time to come to the end of the production cycle to see actual results and how farmers production, productivity, fish mortalities etc have been affected by the information they have picked up from the calendar.

4. Conclusion and recommendations

Conclusions

- An Intervention calendar is quite new and relatively cheap way of information distribution to farmers.
- Since farmers access to technical information is limited, the PAPUSSA technical calendar could contribute significantly to improve farmers knowledge.
- Fish pond management techniques and fingerlings stocking techniques were highly appreciated by farmers in most communities.
- According to farmers perceptions, application of techniques provided in calendar will improve their fish production as well as enhance their fish productivity.
- As a new way of stimulating farmers' attention, PAPUSSA technical calendar highly impressed farmers making them get more access to new information.

Recommendations

- Since farmers are really thirsty for new information, it is highly recommended that local government should pay more attention and spend more resources to improve farmers' aquaculture activities.
- Farmers Union and Extension Centre should apply this way of technical information dissemination to farmers so as farmers are more accessible to new technical information.
- If there is time, it is quite relevant to follow farmers up to their harvest to fully evaluate the significance of the leaflet.
- Possible improvements on the calendar for future years could be to put up the calendar in some other public places such as local commune offices, local agricultural commune offices, agricultural chemicals sellers shops, etc. Also to include photos of local farmers and their systems thus engendering interest and pride, also using the calendar

on an annual basis to update farmers on new innovations in research that might be particularly useful for them. The calendar could also have different themes for each year eg Pond management techniques one year, feed and nutrition the next year, fish disease treatment, women in fish cultivation etc.

- This could be an innovative and low investment method for information dissemination which can be used by the local government/ agricultural extension stations for updating aquaculture technical information. If the feedback process as in our study was carried out well in the future it can give govt fisheries depts valuable indicators in which areas farmers particularly are lacking technical expertise or need more information – eg fish/fingerling stocking came out of this as being important to farmers. From this the fisheries dept would then be better able to tailor and design their extension programmes to meet farmers needs.



KỸ THUẬT CHUẨN BỊ AO



TRƯỜNG ĐẠI HỌC NÔNG LÂM TP HCM
KHOA THỦY SẢN

PHƯƠNG PHÁP PHÒNG VÀ TRỊ MỘT SỐ BỆNH Ở CÁ



Áo đã bón vôi



Cây xối cho đầy ao rồi xối



Vét bùn đáy ao sau mỗi vụ nuôi



Bón vôi cho ao



Lọc nước trước khi cấp vào ao nuôi

CHUẨN BỊ AO

- Thảo can ao, vét lớp bùn đáy còn khoảng 20 - 30cm, sửa chữa hồ ao, dọn sạch cây cỏ.
- Diệt tạp, diệt trùng:
 - Bón vôi bột với lượng từ 10 - 15kg/100m² ao.
 - Phơi nắng khoảng 1 - 2 ngày để cho cá tạp chết và khử trùng tốt.
 - Bón lót bằng phân chuồng (phân heo, gà, cừu) nhằm tăng độ màu mỡ trong ao tạo điều kiện cho các loại thực ăn tự nhiên dễ dàng phát triển. Bón lót bằng phân chuồng: 30kg/100m² ao.
 - Cho nước vào ao, phải lọc nước thật kỹ để tránh cá tạp, cá dừ vào ao vì:
 - Tránh thực ăn vôi cá muối (phá mối);
 - Ăn cá thối rữa.
 - Khoảng 2 - 3 ngày sau khi lấy nước vào mới thả cá.

MẬT ĐỘ THẢ

- Nuôi quảng canh cải tiến
- Điều kiện nước và cung cấp thức ăn bình thường: 4 - 5 con/m².
- Điều kiện nước cấp và thoát chủ động (ra vô thường xuyên), khả năng cung cấp thức ăn cho cá đầy đủ thì có thể thả 6 - 7 con/m².
- Nuôi thâm canh (có sự khì)
 - Điều kiện nước cấp bình thường: 8 - 9 con/m².
 - Điều kiện nước ra vô thường xuyên: 10 - 12 con/m².
- Trước khi thả cá vào ao, nên tắm cá phòng ngừa bệnh bằng một trong những loại hóa chất sau:
 - KMnO₄: 4 - 5ppm (4 - 5mg/L nước)
 - Formol: 0,15 - 0,20L/m² nước.
- Thời gian thả cá:
 - Tốt nhất vào buổi sáng (8 - 10 giờ) hoặc buổi chiều phải sau 17 giờ (mùa nắng).
 - Trước khi thả cá, phải cân bằng nhiệt độ nước trong bao và nước ngoài ao để cá không bị "shock" nhiệt.

MỘT SỐ BIỆN PHÁP QUẢN LÝ AO NUÔI

- Nhận biết ao thiếu Oxygen
 - Đo hàm lượng Oxy trong nước ao.
 - Quan sát "sự nổi đầu"
 - Xử lý ao có độ đục cao
 - Dùng các loại vật chất hữu cơ: cỏ khô, phân chuồng (500 - 1000kg/ha), các rế cây họ đậu.
 - Dùng hóa chất: alum (25 - 50kg/ha), vôi tôi, vôi NN, sắt sulfate, gypsum (250 - 500kg/ha).
 - Xử lý ao có pH cao
 - Sử dụng hóa chất: ammonium sulfate (NH₄)₂SO₄, alum Al₂(SO₄)₃.H₂O, gypsum CaSO₄.2 H₂O.
 - Xử lý ao có thủy sinh thực vật phát triển quá mức: nước ao có màu xanh đậm.
 - Sử dụng hóa chất: BKC, formaline.
 - Sử dụng các tác nhân cơ học: dùng lưới vớt các loài tảo sợi, dùng máy khuấy động...
- Áp dụng các biện pháp sinh học: nuôi các loài cá ăn thực vật thủy sinh.
- Biện pháp chung hiệu quả nhất để xử lý các tình huống:
 - Thay nước cho ao nuôi => cấp thêm nước giàu oxy, loại bỏ tảo, làm sạch nước ao

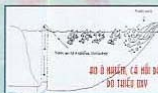
PHÒNG VÀ TRỊ MỘT SỐ BỆNH PHỔ BIẾN Ở CÁ

BỆNH KỶ SINH

- Bệnh kỷ sinh do ký sinh trùng và nấm gây ra như bệnh nấm thủy mi (nấm bông gòn), bệnh sán lá, bệnh trùng mỏ neo, bệnh trùng bánh xe, bệnh trùng quả dưa, ...
- Có thể dùng các loại thuốc sau đây để trị bệnh kỷ sinh trùng:
 - CuSO₄: 25g/m² tắm trong 10 - 15 phút (tắm); 0,5 - 0,7g/m² nước ao (phun).
 - Muối ăn: 20 - 30g/L nước (tắm)
 - Formol: 0,15 - 0,20L/m² nước trong 30 - 40 phút (tắm); 0,015 - 0,020 L/m² nước ao (phun).

BỆNH ĐỐM ĐỎ

- Bệnh này do vi khuẩn gây ra.
- Bệnh thường xuất hiện vào mùa mưa đối với cá nuôi bè như cá diêu hồng, cá tra, cá trê vàng, cá trê lai, ...
- Cá mắc bệnh này thường:
 - Bỏ ăn.
 - Thần mất nhớt.
 - Trên thân và mang có nhiều đốm màu đỏ và lõm loét.
 - Cá chết hàng loạt.
- Sử dụng các loại kháng sinh:
 - Oxytetracycline: 20 - 50g/m² trong 60 phút (tắm); 2 - 5g/m² nước ao (phun).
 - Tetracycline: 20 - 50g/m² trong 60 phút (tắm); 100mg/kg thức ăn (cho ăn).
 - Rifamycin: 10 - 29g/m² trong 60 phút (tắm); 1 - 2g/m² nước ao (phun).



Calendar 2006

1. January						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
23	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

4. April						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

7. July						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

10. October						
MON	TUE	WED	THU	FRI	SAT	SUN
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

2. February						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

5. May						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

8. August						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

11. November						
MON	TUE	WED	THU	FRI	SAT	SUN
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

3. March						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

6. June						
MON	TUE	WED	THU	FRI	SAT	SUN
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

9. September						
MON	TUE	WED	THU	FRI	SAT	SUN
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

12. December						
MON	TUE	WED	THU	FRI	SAT	SUN
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Picture 1 Intervention calendar for technical information distribution to farmers



Picture 2 PAPUSSA staff distributing intervention calendar to a farmer

Yes

No

15. If yes, what do you think the leaflet could benefit you?

- a. Improve fish production
- b. Reduce fish loss
- c. Decrease input cost
- d. Increase effectiveness
- e. No benefit
- f. Others.....
.....

16 Which part of the fact sheet is the most important/interesting for you?

- a. Stocking the fish
- b. Pond preparation
- c. Pond management
- d. Feed
- e. Fish disease
- f. Others:.....

17. Have you ever applied similar techniques given in the fact sheet?

Yes

No

18. What technique have you applied

19 Are you going to apply any technique given in the fact sheet?

Yes

No

20. If yes, what technique are you going to use?

21 If no, please state why?

22 What are the difficulties with your fish farming facing you at the moment?

- a. Stocking fish
- b. Pond preparation
- c. Pond management technique
- d. Feed
- e. Fish disease
- f. Treatment of fish diseases
- g. Poor water quality or pollution

- h. Lack of water
- i. Others:.....

23. What other information that you need but not given in the fact sheet?

24. Do you have further comments on the fact sheet or any useful information from your experience you have which might be useful to include in future fact sheets?