Ministry of Agriculture
of the
Republic of Indonesia

THE SOYBEAN COMMODITY SYSTEM IN INDONESIA : OVERVIEW AND PROPOSALS

Contact and fact-finding mission final report

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1 - Mission outline and acknowledgements

1.1. Outline

Soybean requirements in Indonesia are increasing dramatically : over the period 1989-1996, yearly demand has grown from 1.7 to 2.2 million tonnes and national production has grown from 1.3 to 1.5 million tonnes only. The Government has decided on a plan for self-sufficiency with an objective of 700,000 tonnes increase in production, but more information and study is still needed before coordinated action can be undertaken.

An agronomist from the Center of International Cooperation in Agronomic Research for Development (CIRAD), specialist of tropical oil and protein crops, was requested to make a rapid survey of the soybean production and commodity system in Indonesia, in order to identify possible fields of cooperation between French and Indonesian partners in this matter. This contact and fact-finding mission was carried out by Robert SCHILLING, from the Food Crops Programme of CIRAD, in December 1998. Observations and proposals for action, following a provisional report presented in February 1999, are submitted hereafter to the Ministry of Agriculture, in view of an in-depth study to be undertaken in the near future.

We are grateful to the French Ministry of Foreign Affairs (MAE) for their financial support and attention to our proposals.

1.2. Acknowledgements

The mission took place from December 8 th to 16 th. It was organized very efficiently by the CIRAD representative and Mrs Sarlistyaningsih, from the Direktorat Bina Program of the Ministry of Agriculture, to whom we address our grateful thanks which should be extended to the persons whose names follow and to their collaborators, for the cooperative welcome and the useful information received.

Opportunity was given, on december 9 th in Bogor, to take part with a seminar on soybean breeding for virus resistance, thus giving us the possibility to discuss directly and make appointments with major operators of soybean research, including those that came from other important centers, in particular Malang. Dr Sumarno, CRIFC Director, gave us basic guidelines ; Dr Suyamto, Director of the Research Institute for Legumes, gave useful information and introduced us to his fellow scientists, among which Ir. Moch. Muchlish Adie and Dr. Ir. Darman Arsyad ; a special meeting on plant protection issues was organized by Dr. Roechan, with active

participation of the scientists involved. We are most thankful for their competency, patience and comprehension.

Useful discussions were carried out with Dr Adil basuki Ahza, Director and Dr. Deddy Muchtadi, food scientist, from the Center for Food and Nutrition (Bogor Agricultural University) ; a visit was made to SEAMEO BIOTROP (Dr. Sitanala Arsyad, Director, and Okky Setyawati Dharmaputra, plant pathologist). The seed multiplication issue was covered mainly with Ir. M.H. Manurung, from Direktorat Jenderal Tanaman Pangan, and with Ir. S. Tarigan, PT Sung Hyang Seri, who provided exhaustive data and documentation. Problems of the agro-industrial sector were covered with the collaborators of Yulius Buntarmin, General manager of PT Salim Graha. Useful guidance was given by Mr. Achmad Fuadi, Head of Sub-Directorate for Foreign Cooperation. A fruitful discussion was organized and major orientations were given by the representatives of the Ministry of Agriculture : Ir. Subiyanti Sa'ud and Andy Jaya Dermawan, from the International Cooperation Bureau, to whom our first-hand impressions and suggestions were submitted.

2. The soybean commodity system in Indonesia : Brief outline and general trends

2.1. Production and utilization

Basic economic indicators, calculated from statistics covering the 1980-97 period, are given in table 1. A presentation of the commodity system, with its multiple components and interactions, is given in figure 1 ; evolution of food share and imported share in soybean supply is presented in figure 2. A number of general observations can be infered from these sources and from others not mentioned here :

- Considering the five major food crops : rice, maize, soybean, cassava and groundnut, soybean represents 8 % of cultivated area and 11 % of total crop value. Rice accounts for 62 % of both crop area and value, maize for respectively 18 % and 13 %, cassava and groundnut being equal or inferior to soybean (F. Lançon, 1995).

- Production and national market trend over the 1990-97 period are characterized by :

. Slight but significant decrease in total production ;
. Yield constant around 1.1 tonne/ha ;
. Increase of total human consumption over the 1990-96 period, followed by a sharp decrease in 1997 (confirmed in 1998) ;
. Constant increase of total use and total imports (kernel equivalent) over the 1990-96 period, decrease in 1997 ;
. Share of food in total utilization is decreasing and share of imports in total supply is in sharp increase (from 25 % in 1990 to 60 % in 1996, see figure 2).

- Soybean utilization in Indonesia is characterized by its dual purpose, in a dominant alimentation system based on rice :

. Products for direct human consumption, provided by the traditional soybean cottage industry (tahu and tempeh) ;
. Products of a growing agro-industry based on poultry, consuming soybean oilcake, incorporating more and more animal proteins in the food habits especially in urban areas.

The latter system differs from the first by the high degree of concentration of industrial activities dominated by less than a dozen major operators. National production is entirely absorbed by human consumption and the cottage-industry distribution network, highly dispersed. Local varieties having low extraction rates and other unfavorable characteristics aggravated by poor post-harvest technologies, and national production being unsufficient, the agro-industrial system relies entirely on imports.

- National production is concentrated in Java (east and West) and Northern Sumatra (Aceh), with other important production areas in Bali and Sulawesi, as indicated by the 1998 palawija crops predictions (Ministry of Agriculture) :

- Production predictions 1998 (tonnes)

D.I. Aceh	95 683
Total Sumatera	**237 360**
Jawa Barat	227 148
Jawa Timur	439 621
Total Jawa	**815 221**
N.T.B.	126 419
Total Bali + NT	**153 372**
Sul Sel	57 046
Total Sulawesi	**80 204**
Total Indonesia	**1 313 253**

- Soybean products play an important and increasing role in Indonesian alimentation systems, particularly in Java. With per capita use around 10 kg/year, needs of the indonesian population are comparable and often superior to those of north-eastern Asia (taiwan 13.3, Japan 9.3, China 6.3) and much superior to those of neighbouring countries where 3 kg is generally a maximum. Tahu and tempeh represent respectively 42 and 55 % of total soybean transformed for human consumption ; fabrication by a very high number of small units, followed by immediate distribution, is well adapted to products with shelf-lives not longer than 2 to 3 days. Demand has grown from 5 to 10 kg per capita/year in the 1980-90 period, increase being highest among populations of non-javanese origin (the share of Java in total national production has decreased from 70 % to 40 % within the same period).

- The national soybean market, before the crisis, was undergoing deep transformations linked to the development of the poultry industry (chicken and eggs), cattle industry remaining traditional. The resulting demand on animal feed, even before the crisis, might have been over-estimated, as the industrial capacity for animal feed production is (and already was) severely under-utilized ; large-scale production of poultry and eggs is presently facing difficulties in the new economic context, and the demand for soybean oilcake has already slowed down significantly.

2.2. Present and predictable effects of the financial crisis

The Government of Indonesia has taken measures in order to reduce the impact of soybean products price increases ; BULOG has lost its monopolistic soybean importer position in 1997, but private operators are still waiting for stocks to be consumed before importing. Moreover, devaluation of the Rupiah has about doubled the price of imported soybean, this still reducing the incentive. Major problem remains the decreasing purchasing power of the indonesian consumer : what will be the effect on his food habits ?

2.2.1. Immediate and overall effects

A - The animal feed system has been more severely hit by the depreciation of the Rupiah, because it depended mainly on imports. Oilcake imports have increased from 128,000 tonnes (1989-91 average) to 500,000 t in 1993 and almost 1,000,000 t in 1996. In 1997, imports went down by 50 %. If we consider an average price of 250 USD in 1998 and an exchange rate of Rp 8 000 for 1 USD, the value of oilcake wouldbe Rp 2 000/t in 1998, three times the 1996 price. This had of course severe consequences on the prices of poultry, alleviated in a first stage because producers were compelled to reduce rapidly their production and stocks, thus increasing temporarily the offer. Prices of chicken are now augmenting very rapidly. It is considered that oilcake use (and therefore soybean imports) in 1998 will be 50 % lower than in 1997.

B - Effects of the financial crisis on the human consumption system have been less dramatic, the first reason being that local soybean production still provides more than 60 % of the soybean transformed into tahu and tempeh. The second reason is that BULOG, who had a monopoly on soybean kernel imports until August 1997, has regulated the offer to KOPTI members (transformation cooperatives), but stocks are now getting low and price increases are to be expected.

2.2.2. Predictable effects

- **In the short term**, for soybean as for other commodities, drought will have aggravated the effects of the financial crisis. Soybean requires less imported inputs than rice and the prices of these inputs are going up : this could have a positive effect on the soybean financial balance, but the risk factor-linked in particular to disease and pest susceptibility - is higher for soybean than for rice and maize, and should be kept in mind in the short and medium terms.

- **In the medium term**, an additional factor could be tension on the local market resulting from decreasing soybean imports, thus enhancing national production.

- **In the long term**, domestic demand could be influenced by changes in alimentation styles, reducing costly products such as poultry, giving advantage to tahu and tempeh.

In conclusion, liberalization of the soybean market could have limited negative side-effects in the short and medium terms, because national production, after devaluation of the Rupiah, will be more competitive vis-à-vis imported soybean. The terms of this balance will have to be carefully examined. It is not certain that price increase of soybean products would result in reduction of domestic demand, if indonesian consumers substitute vegetal proteins to animal proteins ; it is to be kept in mind that tahu is often sold in the same retailer shops as chicken...

There is, therefore, no reason to be pessimistic as to the possibility and appropriateness of increasing soybean production in Indonesia, and as to the possibility of reducing soybean imports.

Table 1 : Soybean market (tonnes or specified units)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Acreage (ha)	732 346	809 978	607 783	639 876	858 854	896 220	1 253 767	1 100 565	1 177 360	1 198 096	1 334 100	1 368 199	1 665 706	1 407 000	1 477 000	1 280 000	1 180 000	1 145 000
Production (tonnes)	652 762	703 811	521 394	536 103	769 384	869 718	1 226 727	1 160 963	1 270 418	1 315 113	1 487 433	1 555 453	1 869 713	1 555 000	1 680 000	1 517 000	1 400 000	1 360 000
Yield (tonnes/ha)	0,891	0,869	0,858	0,838	0,896	0,970	0,978	1,055	1,079	1,098	1,115	1,137	1,122	1,105	1,137	1,185	1,186	1,188
Losses ans seed use	118 830	114 846	94 561	107 275	137 137	167 055	202 235	198 184	212 355	224 519	246 902	269 940	294 716	260 450	265 600	241 040	225 250	220 450
Kernel imports	100 878	1 414	1 257	390 904	400478	330 119	342 721	349 370	586 458	410 462	456 522	526 429	556 543	628 000	537 000	703 000	846 000	690 000
Total availability	753 640	705 225	522 651	927 007	1 169 862	1 199 837	1 569 448	1 510 333	1 856 876	1 725 575	1 943 955	2 081 882	2 426 256	2 183 000	2 217 000	2 220 000	2 246 000	2 050 000
Crushing	0	0	0	0	0	0	0	0	159 318	248 529	217 468	203 833	252 051	140 000	100 000	60 000	0	0
Total use human consumption	753 640	705 225	522 651	927 007	1 169 862	1 199 837	1 569 448	1 510 333	1 697 558	1 477 046	1 726 487	1 878 049	2 174 205	2 043 000	2 117 000	2 160 000	2 246 000	2 050 000
Oilcake production	0	0	0	0	0	0	0	0	127 454	198 823	173 974	163 066	201 641	112 000	80 000	48 000	0	0
Oilcake imports	26 640	199 775	71 769	103 568	206 076	175 223	306 716	257 000	72 323	186 700	5 252	193 348	170 631	499 000	682 000	942 000	986 000	450 000
Oilcake total use	26 640	199 775	71 769	103 568	206 076	175 223	306 716	257 000	199 777	385 523	179 226	356 414	372 272	611 000	762 000	990 000	986 000	450 000
O.T.U. kernel equivalent	33 300	249 719	89 711	129 460	257 595	219 029	383 395	321 250	249 722	481 904	224 033	445 518	465 340	763 750	952 500	1 237 500	1 232 500	562 500
Total imports kernel equivalent	122 190	161 234	58 672	473 758	565 339	470 297	588 094	554 970	644 316	559 822	460 724	681 107	693 048	1 027 200	1 082 600	1 456 600	1 634 800	1 050 000
Total use k. equivalent	786 940	954 944	612 362	1056 467	1 427 457	1 418 866	1 952 843	1 831 583	1 947 280	1 958 950	1 950 520	2 323 567	2 639 545	2 806 750	3 069 500	3 397 500	3 478 500	2 612 500
% human cons./total ut. k. equiv.	96 %	74 %	85 %	88 %	82 %	85 %	80 %	82 %	87 %	75 %	89 %	81 %	82 %	73 %	69 %	64 %	65 %	78 %
% K. imports Human cons	13 %	0 %	0 %	42 %	34 %	28 %	22 %	23 %	25 %	11 %	14 %	17 %	14 %	24 %	21 %	30 %	38 %	34 %
% imports share k. equiv.	16 %	17 %	10 %	45 %	40 %	33 %	30 %	30 %	33 %	29 %	24 %	29 %	26 %	37 %	35 %	43 %	47 %	40 %
Per capita human ut. (Kg)	5,118	4,697	3,414	5.938	7,349	7,392	9,482	8,949	9,864	8,417	9,648	10,292	11,685	10,768	10,942	10,949	11,165	9,994
Oilcake ut per capita (kg)	0,226	1,663	0,586	0,829	1,618	1,349	2,316	1,903	1,451	2,746	1,252	2,442	2,501	4,025	4,923	6,273	6,127	2,742

Source : CBS and US Embassy Jakarta, presented by F.Lançon, CIRAD

Table 2 : Statistical data : prices (rupiah)

Année		1991	1992	1993	1994	1995	1996	1997	1998
Mean gross price Jakarta Rp/kg	. Soy	1151	1105	1165	1215	1148	1148	1166	2000
	. Rice				868	1248	1013	1017	
	. Maize				459	500	627	576	
Rice producer price Rp/kg		295	330	340	360	400	450	525	600
Urea Rp/kg		210	220	240	260	260	330	400	400
Price index (1998=100)	. Gross price agriculture		225	251	298	355	399	441	
	. Detail price alimentation			136	156	179	189	227	251
	. Detail price total			148	163	177	189	211	226
Mean yearly exchange rate (Rp/USD)				2110	2200	2308	2383	4650	8000
International market price (FOB Rotterdam USD/tonne)	. Soy			246	259	248	304	278	291
	. Oilcake			207	202	184	256	260	258
Relative prices	. Soy/rice				1.40	0.92	1.13	1.15	
	. Soy/maize				2.65	2.30	1.83	2.02	
	. Rice/Urea	1.4	1.5	1.4	1.4	1.5	1.4	1.3	1.5
Index base 100 = 1993	. Soy gross market			100	104	99	99	100	172
	. Gross price agriculture			100	119	141	159	176	
	. Detail price alimentation			100	115	132	139	167	185
	. Detail price total			100	110	120	128	143	153
World market price in Rupiah	. Soy			519	570	572	724	1293	2328
	. Oilcake			437	444	425	610	1209	2064

Note : 1998 = January

Sources : CBS and FAS-USDA, presented by F. Lançon, CIRAD

Figure 1 : The soybean commodity system in Indonesia

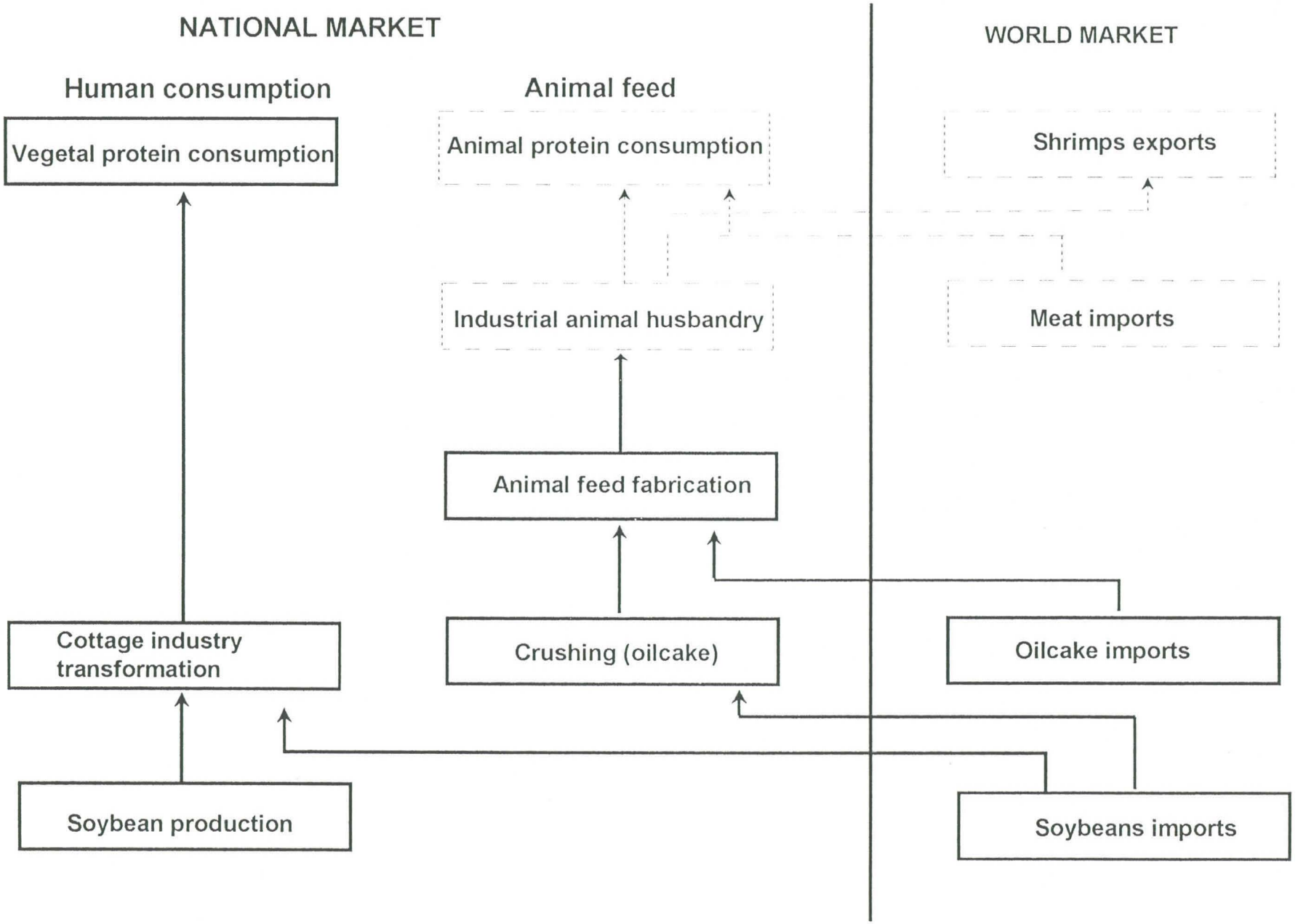
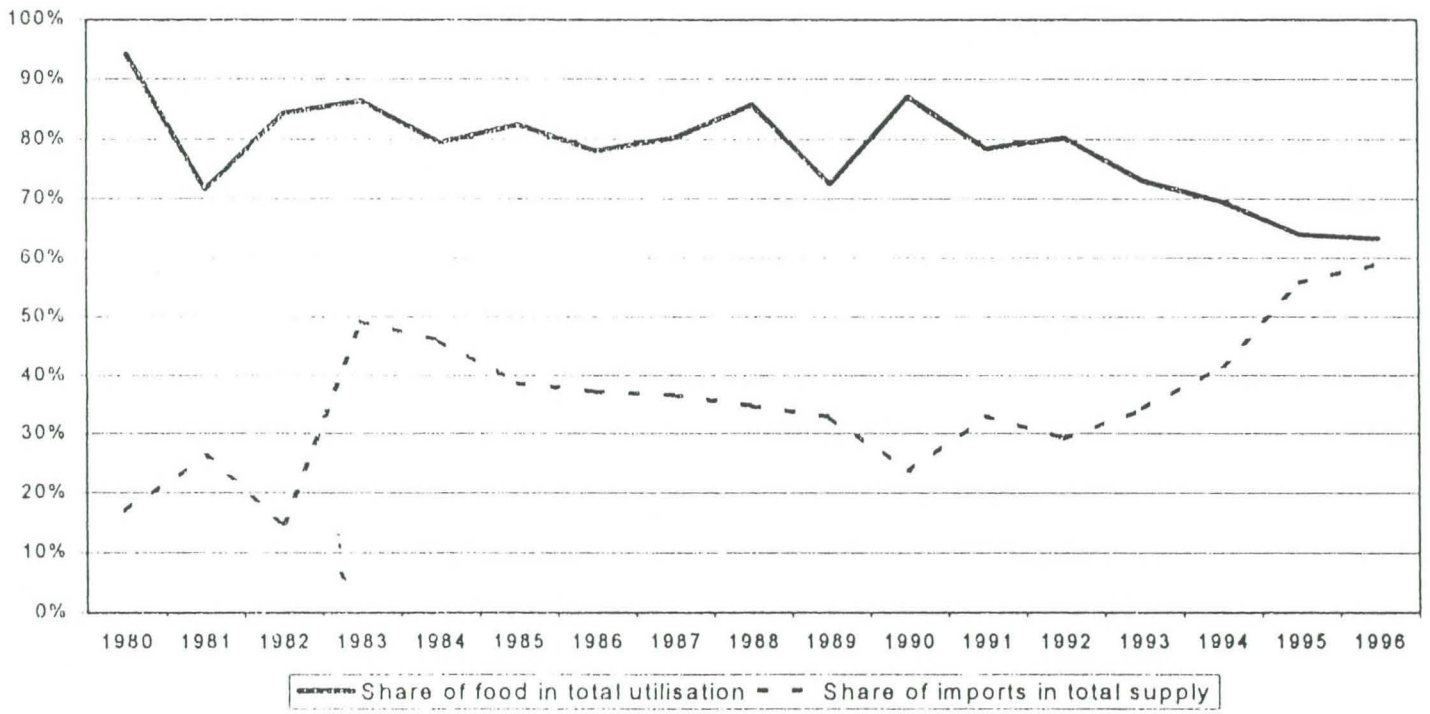


Figure 2. Evolution of soybean food share in total soybean utilization and importation in soybean supply



3 - Soybean production enhancement : intensification success factors

3.1. The Package of Technology for yield improvement

Official recommendations for soybean production, issued by Research and given in a document dated August 1998, are summarized hereafter ("optimal technology for soybean production"). This "intensive" package (supra insus) can be adapted to "medium" and "low" situations and to different cropping systems (rainfed, irrigated, newly cleared land). Very broad estimates of production costs and benefits, difficult to analyze under present economic circumstances, are given in the same document and presented synthetically in table 3 (inputs and labour requirements) and table 4 (estimated costs and benefits). All the officers in charge of Research, Extension and Planning that we could meet agreed on the fact that the application rate of these recommendations was low, although not unsignificant if we consider the last reliable figures available (the financial crisis should not have improved the situation) :

- Inputs utilization in 1993 (kg/ha)

Crop	Fertilizer	Insecticide	Pesticide
Rice irrigated	319	2.62	0.68
Rice non-irr.	113	0.42	0.07
Maize	146	0.13	0.04
Cassava	91.4	0.01	-
Soybean	106	1.49	0.20
Groundnut	79.1	0.27	0.05

Source : CBS and US Embassy, Jakarta

Optimal technology for soybean production

Irrigated lowland	Rainfed upland
1. Intensification of cropping pattern, from ip = 2 (rice/soy) to ip = 3 (R/R/S/)	1. Cropping rate >2 when possible
2. Land preparation : no-tillage (TOT) or minimum tillage (MOT) after rice	2. TOT land preparation with herbicide
3. Treated seed of improved varieties	3. Treated seed of improved varieties
4. Rhizobium inoculation	4. Rhizobium inoculation
5. Optimal plant population : 400,000 to 500,000/ha	5. Optimal plant population : 400,000 to 500,000/ha
6. Integrated pest management	6. Integrated pest management
7. Balanced fertilization	7. Balanced fertilization
8. When appropriate : liquid fertilizer (N) and growth regulators	8. When appropriate : liquid fertilizer (N) and growth regulators
9. Appropriate water management	9. When possible, complementary irrigation
10. Early weed control	10. Early weed control
11. Improved harvest and post-harvest technology	11. Liming
	12. Improved harvest ans post-harvest technology

Very approaching packages of technology (POT), and similar planting material, were tested previously by several operators, among which

- The Soybean Intensification Experience of the FAO Technical Assistance Co-operation Programme in East Java (1985, reported in "Soybean Research and Development in Indonesia", CGPRT doc. N° 10),

- The Soybean Yield Gap Analysis Project, SYGAP (1992, AARD report).

It was concluded (in 1992) that the proposed POT was not adapted to the diversity and variability of cropping situations, and did not lead to increases in productivity constant and significant enough to be convincing to the farmer : "... intensification of soybean cropping is quite hazardous as it leads neither to an increased yield sufficient to cover additional costs, nor to a reduction of yield variability to which farmers are very sensitive" (from above-mentioned SYGAP-AARD report page 62).

Is this still the case today, considering that the recommendations did not change substantially and that the economic environment has not improved ? Is this a cause for the low yields recorded in Indonesia ?

3.2. Identification of constraints and intensification success factors

A - The above-mentioned FAO project (on line with recent investigations and the conclusions of the National Taskforce for Soybean Enhancement) identified the three major constraints to soybean production in the country as being :

1) The lack of quality seed of improved varieties,
2) The prevalance of pests, diseases and weeds,and
3) The lack of skill and knowledge of the extension workers and farmers in the field of soybean production techniques.

Recommendations for Governement action, based on experience gained in the FAO project, were presented as follows :

- Improve access to credit,
- Involve the Government owned seed-companies and the private seed supply network more strongly into the soybean seed production and distribution issue,
- Upgrade the efficiency of the extension network,
- Eliminate, from the POT, the impractical and "high tech" components which draw the farmer's attention away from the more basic issues at hand,
- Stimulate research and development of plant protection techniques and equipment.

B - Bogor Research Institute for Food Crops (Sumarno, 1987, CGPRT document n° 10) listed as follows the factors which constrain soybean yield in Indonesia :

- Lack of suitable varieties,
- Seed unavailability,
- Unsufficient land preparation,
- Poor seed stand and crop establishment,
- Unappropriate planting dates,
- Minimal fertilizer use and poor nodulation,
- Water-logging and/or drought stress,
- Pest, disease and weed infestation.

The same scientist (presently Director of the Food Crops Research Institute) listed as follows the technical "key success factors" leading to soybean intensification (communication presented on the Soybean seminar, Bogor, December 9 th 1998) :

- Determine proper planting time,
- Prepare land adequately depending on soil type and planting time,
- Use appropriate variety,
- Use high quality seed with proper planting rate (400,000 plants/ha),
- Apply fertilizer in accordance with fertility,
- Inoculate on newly-planted land,
- Weed as necessary,
- Maintain moisture at 75-80 %,
- Monitor pests and diseases according to IPM strategy,
- Harvest and apply post-harvest technologies as requested for best quality.

It is acknowledged that many of these factors still need research support, especially in the fields of varietal improvement, seed technology and plant protection.

C - An official document, "Information paper prepared for donor meeting" (1998), presents as follows the constraints that the country has to face in order to speed up the domestic production :

"First, the productivity of the existing Seed farms is still relatively below the target. For instance, the productivity of the foundation seed (FS) for soybean in 1996/1997 was 0.47 t/ha, while the target was 0.80 t/ha. In addition, the production of extension seed (ES) of soybean is also far below the requirement. The annual average production of the extension seed was about 250 t per year over the period 1994/95 to 1996/97. The figure was only about 0.4 per cent of the total need, while the annual market demand of soybean seed was 5 per cent over that period. This resulted in the disturbance of the continuity of seed supply needed.

Besides productivity, the punctuality of seed supply and the suitability of variety needed, both in terms of amount and quality, are still problems. The just-in-time delivery system of qualified seed, therefore, has become a key factor to succeed the development of soybean production. The application of appropriate technology for soybean cultivation as recommended, on the other hand, is also another key factor.

Other constraints, such as farmer's acquisition of soybean cultivation technology, the availability of capital held by farmer,and farmer perception on soybean crop as a secondary crop, need to improve. Additionally, partnership system to strengthen market institution as well as to guarantee the price of soybean is also urgently needed".

D - **In conclusion** from the above and other sources (no field investigation was possible during this contact mission), and from our interviews with Research and Extension operators in Jakarta, the common statement is that seed availability, in sufficient quantities and proper quality, is a major constraint to crop extension and improvement. This results from basic characteristics of the soybean plant and from agro-economic conditions which occur in most smallholder production systems under the tropics. There can be no solution to the present problems of soybean production in Indonesia, as summarized hereafter, unless a substainable seed multiplication and distribution system is set up.

a) Soybean is considered a high risk, and therefore low priority, crop because of its susceptibility to pest infestation, disease, water logging and drought ; the farmer is therefore reluctant to invest in costly inputs.

b) Priority given to rice and off-farm employment results in unsufficient manpower and inputs allocation for the soybean crop, often relegated on soils and in seasons not appropriate for the plant.

c) The early-maturing varieties used in Indonesia with the objective of growing three crops a year are potentially less productive than the late-maturing types. Lack of fungicide seed dressing results in poor germination which the farmer tries to compensate by seeding rates much higher than required if the seed was properly dressed.

d) Other negative factors are late seed delivery, unadequate land preparation and uneven seed distribution, poor crop development caused by weed competitors, a wide range of field and storage pests as well as fungal and viral diseases, poor drying and storage conditions resulting in rapid degradation of biological and technological parameters (germinative capacity and percentage of sound, clean, mature seed).

The often-mentioned "unwillingness" and "incapacity" of the farmer to do the work optimally,in our opinion, would deserve closer attention...

Table 3

Soybean factors of production and manpower requirements per hectare

	Rainfed	Irrigated	Newly cleared land
Inputs			
. Urea (kg)	50	50	50
. SP 36 "	50	100	100
. Kcl "	-	50	50
. Sex pheromone PHT (dose)	3	3	3
. Seed	60	60	60
. Inoculant (dose)	1	1	1
. Lime	-	-	-
. Herbicide (dose)	2	-	-
Cultural operations			
mandays hired : H mandays familial : F			
. Land preparation	H2 F2	H6 F2	H6 F2
. Drainage, clearing	-	H11 F4	H6 F2
. Herbicide application	F1	-	-
. Planting	F3	F3	F3
. Irrigation	-	F2	-
. Weeding	-	H11 F5	H11 F5
. Fertilizer application	H4 F2	H4 F4	H4 F4
. Plant protection (PHT)	F2	F2	F2
. Harvest	H6 F4	H8 F4	H6 F4
. Threshing, transport	H6 F4	H8 F4	H6 F4
Total mandays	36	78	65
Land and irrigation			
. PBB (rupiah)	7,000	10,000	10,000
. Rental "	175,000	450,000	450,000
. Water	-		30,000

Source :Ministry of Agriculture, 1998

Table 4

Soybean : estimated production costs and benefits

	Rainfed	Irrigated	Newly Cleared
ITEMS (Rupiah)			
. Urea	22 500	22 500	22 500
. SP	35 000	70 000	70 000
. KCL	-	100 000	100 000
. PHT	15 000	15 000	15 000
. Seed	180 000	180 000	180 000
. Inoculant	23 000	23 000	23 000
. Herbicide	120 000	-	-
. Land prep. H	12 000	36 000	36 000
. Drainage/clearing H	-	66 000	36 000
. Herbicide application H	-	-	-
. Planting H	-	-	-
. Irrigation H	-	-	-
. Weeding H	-	66 000	66 000
. Fertilizer application H	24 000	24 000	24 000
. Plant protection H	-	-	-
. Harvest H	36 000	48 000	36 000
. Threshing, transport H	36 000	48 000	36 000
. PBB	7 000	10 000	10 000
. Land rent	175 000	450 000	250 000
. Water	-	30 000	30 000
A - TOTAL COST (Family labour not included)	685 500	1 188 500	934 500
Yield (kg/ha)	900	1 600	1 400
B - GROSS RETURN (rupiah) (1 kg soybean : 2 000 R)	1 800 000	3 200 000	2 800 000
BENEFIT (rupiah) B - A	1 114 500	2 011 500	1 865 500

Source : Min. Agric., 1998

4 - The seed production and distribution issue

4.1. Task-force recommendations and proposed strategy for soybean production increase

The prospect for crop extension and increase in productivity, answering the official objective of reaching self-sufficiency before year 2001, is based on the figures given on tables 5 and 6 drawn from the national development plan.

Table 5 - Proyeksi luas panen, produktivitas dan produksi kedelai dalam repelita VII

Uraian	Akhir R-VI 1998	Repelita VII					Pertbh/tahun (%)
		1999	2000	2001	2002	2003	
1. Luas Panen (000 ha)	1.330	1.450	1.600	1.800	1.900	2.000	8,54
2. Produktivitas (Ku/ha)	13,93	15,50	16,50	17,50	17,90	18,20	5,55
3. Produksi (000 Ton)	1.852	2.247	2.640,0	3.150	3.401	3.640	14,63

Table 6 - Proyeski konsumsi dan produksi kedelai dalam repelita VII

Tahun	(Population) Jumlah penduduk tengah tahunan (000 jiwa)	Konsumi Manusia		Produksi (000 ton)	Plus/minus (000 ton)	Keterangan
		kg/kap (per capita)	Total (000 Ton)			
1	2	3	4 (2 x3)	5	6 (5-4)	7
1999	205.932	12,20	2.512	2.247	- 265	Kebutuhan belum termasuk untuk industri makanen dan pakan ternak
2000	208.939	12,57	2.626	2.640	- 14	
2001	211.943	12,94	2.743	3.150	+ 407	
2002	214.953	13,33	2.865	3.401	+ 536	
2003	217.962	13,73	2.993	3.640	+ 647	
pertum-buhan/thn (%)	1,43	3,00	4,47	4.87	2,46	

This very ambitions aim is to be obtained through several directions, as described in a Ministry of Agriculture document entitled "Strategy and measures taken for achievement of target on paddy and secondary crop production" (february 1998) :

- Intensification of cropping pattern from 2 to 3 crops a year ;

- Yield improvement (productivity) of 5,5 % per year ;

- Planted area increase, especially in newly opened production areas, of 8.5 % per year ;

- Special effort on training and operational expenditure (seed, inputs, equipments), expected from both Government and agribusiness.

In 1998-99, production increase was expected from improvement of cropping intensity on 220,000 ha, from yield improvement on 620,000 ha and from new production areas on 257,000 ha ; self-sufficiency was to be achieved the very next year. Crop area calculation scenarios and planting programs by geographic zones, types of intensification and planting seasons were determined accordingly. The general philosophy of this approach is as yet strictly quantitative and bureaucratic, based on arithmetic calculation of needs, yield projections, corresponding crop areas and input requirements, with little attention at this stage to the agronomic and socio-economic feasability of this scheme and to the organisational aspects by which the whole system is to be coherently implemented.

4.2. A national seed production tentative strategy

Seed is a compulsory production factor and component of any crop development programme ; seed requirement will be directly proportionate to extension and improvement of planted areas and seed availability is among the first objectives to be achieved. A former project, carried out with EU contribution from 1992 to 1996, was in charge of Palawija Seed Production and Marketing Activities, with particular attention given to legume crops (soybean, groundnuts and mungbean). Results have been disappointing for different reasons, the principal ones being

- Unsufficient coordination between the multiple operators in the seed sector, public or private ;

- Unsufficient financial incentive for both the user (the soybean farmer) and the processor (the seed company), the price difference (20 %) between stock production and so-called "improved" seed being too high for the first and too low for the second.

Reasons for this failure will have to be carefully investigated before new action is undertaken.

An official discussion group is presently in charge of preparing a strategy and a development program for soybean seed production and distribution. The report issued late 1998 gives an up-to-date image of the major issues of this reflection :

- The "modern" production system, distributing planting material ("blue label seed") descending from breeder seed of improved varieties, covers less than 5 % of the needs. The rest is provided by the traditional "Jabalsim" system. Both systems need improvement and should be coordinated, with progressive increase of improved seed availability and reduction of the present shortage situation.

- Institutional aspects, even though the system is to be liberalized, should not be neglected : production, processing, quality control, credit, distribution and marketing, definition of a sustainable policy of price and subsidy, are important and interactive key factors of success and should be State-coordinated.

- Seed requirements are targeted as presented on table 7 :

Table 7 : Area target and seed requirements in 1998-2001

	1998	1999	2000	2001
Planting area (ha)	1,019,170	1,529,615	1,621,050	1,750,526
Seed potential need (t)	50,958	76,480	81,052	87,525
Seed needs (t) "Blue label"	2,547 (5 %)	7,648 (10 %)	12,157 (15 %)	17,505 (20 %)
Jabal system	48,410 (95 %)	68,832 (90 %)	68,894 (85 %)	70,021 (80 %)

- Seed business will be privatized. Government involvement, besides general coordination, would concentrate on research, quality control, information-extension, pricing and subsidy rationale, upgrading the cooperative system and improving the planting material through breeding and adapted seed technology.

- A general multiplication, production, storage and distribution plan will be set up, combining regional choice of varieties, cropping areas and systems, farmer population, planting seasons, credit and marketing organization. Required acreage for seed production and accompanying implements (control, storage, transport, etc...) Will be determined accordingly.

- Seed multiplication centers will be created, with participation of contract farmers chosen for their capacity, working with commercial operators. The advantage expected from this approach is the combination of agricultural know-how with entrepreneurship, marketing and management expertice.

4.3. Proposal for action : contribution to the implementation of a national strategy

In the long term, breeding of high-yielding varieties, included in a package of technology in association with other crop intensification components, would provide the agronomic basis for a soybean green revolution. These are not available yet : no existing variety, local or imported, has given yields constantly and significantly superior when grown in the prevailing agronomic context, and the agro-industrial sector still relies solely on imports for their transformation activities.

The very strategic importance of the seed issue results from a number of fundamental characteristics of the soybean plant as well as from the present technical and socio-economic situation of the crop in Indonesia :

1) Soybean seed is bulky, fragile, susceptible to a wide range of storage pests. It should be handled with care during and after harvest. Its high oil-content, as well as the absence of a natural protection (strong tegument, hull or shell), results in rapid degradation of physical and chemical (acidity, rancidity, kernel integrity) as well as biological (germinative capacity and energy) parameters, especially under temperature and humidity conditions prevailing in wet tropical areas.

2) Recommended planting rates are 400,000 to 500,000 plants per hectare. This results in high seed requirements (minimum 60 kg/ha) and a low multiplication rate. The quantity of seed to be preserved from one season to another being important, and seed viability under traditional on-farm storage conditions being inferior to three months, the small farmer meets the greatest difficulty in preserving or renewing his seed capital, if he does not receive consistant help.

3) Potential needs of seed, as assessed by the national soybean task-force, should increase from 51,000 tonnes in 1998 to 88,000 tonnes in 2001. Meeting these requirements will necessitate the involvement and improvement of the traditional seed production system in collaboration with and under control of national (Research, Extension) as well as private operators (seed companies). The situation in existing production areas and prospective extension areas will certainly require different strategies, based on a progressive approach :

- Overall identification of constraints and evaluation of needs at national level ;
- Definition and implementation of an inception phase (2-3 years) in an area characteristic of and contributing significantly to indonesian soybean production (East-Java could be a good choice) ;
- Project evaluation and extension study in other regions, with special consideration to crop area increase in newly cleared areas (Sumatra, Irian Jaya).

The indonesian farmer cannot afford commercial seed at real cost, and should not use local on-farm seed production for more than three cropping seasons. Improved seed at affordable price, produced through a genealogical multiplication scheme and distribution system compatible with his needs and capacity, should be provided, preferably on a yearly basis. An adequate mechanism, involving scientific, logistic, economic and financial components, should be set up and tested in a major production area during an inception phase of 2-3 years and then extended to other areas. The best yielding existing varieties will be used at first hand ; in the meanwhile, breeding programmes and testing of imported varieties should be enhanced in order to come up as soon as possible with improved planting material.

An adequate seed production system adapted to indonesian conditions could be based on a network of contract farmers producing certified seed under control of a vertical structure integrating and coordinating the work of public and private participants : research producing breeder seed, private operators and extension services (or projects) producing the following generations, directly from foundation seed for certified seed I and in collaboration with specialized farmers for certified seed II and III.

The seed multiplication network will be integrated into the traditional producer system, except for specific aspects related to varietal purity as well as biological and technological quality. The basic husbandry in both cases being the same, this network would serve as a confirmation and demonstration benchmark for the extension of improved practices, in close relation with research scientists in order to increase their awareness of farmer problems and needs.

A second mission, more in-depth, carried out by a franco-indonesian team, with back-up from agro-economists and seed specialists, should be scheduled for the near future. Terms of reference for this study, based on the proposed option, are given in the following chapter.

5 - Tentative terms of reference for a project identification study

5.1. Justification, outline and objectives

Soybean imports in Indonesia have reached 700,000 tonnes and Indonesian authorities have decided on a plan for self-sufficiency before year 2001. This would be obtained through productivity improvement and crop area increase. A special task-force is in charge of the preparation and implementation of this plan, but more information is needed on all aspects (agronomic, organizational and economic) of the commodity system, especially the seed issue.

Participation of France, through the Center of International Cooperation in Agronomic Research for Development (CIRAD), has been requested and a contact mission has been carried out in december 1998 in order to identify possible fields of collaboration between Indonesian and French institutions involved in soybean research and development. The terms of reference of a project identification mission are therefore proposed hereafter.

The strategic importance of the seed issue is acknowledged by all. Priority action in this sector is proposed, along with a survey complementing the information gathered by the contact mission on aspects related to this issue. The mission would be carried out in collaboration with indonesian partners (a counterpart will be provided). Support will be received from CIRAD specialists and French seed operators, as well as from CIRAD Representation and scientists appointed in Indonesia.

The objective of this study would be to provide an analysis of the soybean commodity system in Indonesia, with special regard to the seed sector :

- Overall evaluation of needs and identification of constraints to appropriate seed production and distribution, at national level ;

- Identification of a seed project inception phase (2-3 years), in an area characteristic of, and contributing significantly to, Indonesian soybean production, such as East-Java.

5.2. Agronomic survey

- Description and evaluation of the crop : production areas, yields, cropping systems and production costs ;

- Summary of research results as compared with farmer practices, evaluation of the package of technology (POT), analysis of the gap between actual and potential yields ; identification of constraints and guideline proposals for improvement :

. Cropping patterns and rotations ;
. Planting material ;
. Crop management ;
. Fertilization and inoculation ;
. Plant protection ;
. Post-harvest technology.

5.3. Commodity system survey (indonesian counterpart contribution)

- Soybean production, utilizations and market in Indonesia : basic data, marketing, transformation.

- The national strategy for production increase.

- General economic organization and evolution of the system : coordination mechanisms, major bottlenecks, impact of the financial crisis resulting from liberalization and devaluation, predictable effects and trends on production/transformation/utilization and imports, for both the human consumption and animal feed sub-sectors.

- Socio-economic analysis : production costs, crop return and risk assessment as compared to other commodities.

- Elements for the definition of a development strategy : intensification or extensive production.

5.4. The seed issue : project identification

5.4.1. Basic principles and recommendations for action

- Characteristics of planting material with regard to seed production and the requirements of Indonesian farming systems and agro-industry.

- Rationale of a genealogical multiplication scheme ; quantification of needs and definition of quality standards and production, processing and storage methods recommended for each multiplication level.

- Description and evaluation of the traditional and official seed production systems. Retrospective analysis of former seed projects, conclusions and recommandations.

5.4.2. Elements for project identification

- Preparation of an inception phase : choice of a production area, of local operators and definition of a production/distribution programme with participation of existing structures and projects (CASER).

- Definition of a vertical coordination mechanism integrating the various activities and responsibilities related to seed production and distribution , among which breeder seed multiplication ; first levels of multiplication ; later levels of multiplication ; storage and distribution ; quality control ; pricing, financing and credit. Identification of operators.

- Evaluation and optimization of the improvement to be expected from the technical innovations recommended. Linkage and feed-back with research orientations and production increase.

5. 5 - Elements of cost (in FF)

The field study (17 days, travel included) will be carried out by
- A CIRAD senior agronomist,
- An Indonesian agro-economist, familiar with the soybean seed issue, provided by GOI.

- Inclusive costs :

. Indonesian expert costs will be in charge of GOI.	
. CIRAD expert, in Indonesia : E3 = 3,663 FF/day x 17 days =	62,271
. CIRAD expert, back to office work,support from CIRAD economist in France 3,091 x 5 =	15,455
. CIRAD expert per diem allowance : 156 USD/day x 5.5 = 858 x 17 days =	14,586
. Documentation, report	5,000
Sub- total	129,814

- Invoice costs :

. Travel fee Montpellier-Jakarta and back :	9,000
. Domestic flights expert + counterpart :	7,000
. Land travel, car rental, local expenditure :	6,500
Sub-total :	23,500 FF
TOTAL :	119,812 FF

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