

PROJECT PROPOSAL

Integrated Pest Management for Cotton

INTEGRATED PEST MANAGEMENT FOR COTTON

Financing Summary

Sponsoring ICB : International Cotton Advisory Committee (ICAC)

Recipient : ICAC

Project Executing Agency : Israel Cotton Production and Marketing Board Ltd.

Supervisory Body : ICAC

Location of the Project : Israel, Egypt, Ethiopia and Zimbabwe

Duration of the Project : Four years

Objective and Scope of Project : The broad objective of the project is to introduce least cost and environmentally positive integrated pest management to globally raise the productivity of cotton and increase benefits to both producers, and consumers. The specific objectives would include: the production of high quality non-sticky cotton; improvement in profitability for both raw cotton producers and processors; and reduction in damage to the environment. The project would develop new target-oriented environmentally compatible pesticide formulations and their application methods; promote biological pest control; develop guidelines for an economic use of these methods in order to enable sustainable production of contaminant-free cotton; and disseminate the project findings through workshops, and training including on-the-job and formal training of staff from participating and some other developing countries. The specific subjects of research are two major cotton pests *Bemisia tabaci* and *Aphis gossypii*.

Total Project Cost : US\$ 5,390,270

Amount of Fund Financing : Grant: SDR 2,192,274 (equivalent to appr. US\$ 3,074,620)

Counterpart

Contribution (by Sources) : Israel US\$ 1,910,190
Egypt US\$ 380,710

Zimbabwe US\$ 13,750

Ethiopia US\$ 11,000

Previous Assistance(s) to the Sponsoring ICB:

Title of Project : Study of Cotton Production Prospects for the
Nineties

PEA : IBRD

Amount of Assistance : Grant: SDR 389,879

Board Approval Date : 13 October 1992

Closing Date : 31 March 1995

Disbursement as at
31 Jan 1994 : SDR 186,048 (48%)

ABBREVIATIONS AND ACRONYMS

ARO	-	Agricultural Research Organization of Israel
Br	-	Ethiopian Birr
CAB	-	Cotton Marketing Board of Zimbabwe
CINADCO	-	Centre for International Agricultural Development Corporation
CRI	-	Cotton Research Institute
IBRD	-	International Bank for Reconstruction and Development (World Bank)
ICAC	-	International Cotton Advisory Committee
ICPMB	-	Israel Cotton Production and Marketing Board Ltd.
IMA	-	Israel Ministry of Agriculture
IPM	-	Integrated Pest Management
LDCs	-	Least Developed Countries
LE	-	Egyptian Pound
NICs	-	Newly Industrialized Countries
NIS	-	New Shekel (Israeli Currency)
PEA	-	Project Executing Agency
PCC	-	Project Coordinating Committee
PPRI	-	Plant Protection Research Institute (Egypt)
PY	-	Project Year
Z\$	-	Zimbabwe Dollar

APPRAISAL AND RECOMMENDATION OF THE MANAGING DIRECTOR TO THE EXECUTIVE BOARD

Integrated Pest Management for Cotton

1. The Managing Director hereby submits the following Appraisal and Recommendations on a proposed financing assistance to the International Cotton Advisory Committee (ICAC) for SDR 2,192,274 (equivalent to approximately US\$ 3,074,620) in the form of a grant to assist in financing the project "Integrated Pest Management for Cotton". The International Cotton Advisory Committee would be the Supervisory Body.

PART I. INTRODUCTION

A. Project Background

2. The project proposal has been submitted by the International Cotton Advisory Committee (ICAC) in January 1993. The initial proposal was reviewed by the Consultative Committee in May 1993. Based on the recommendations made by the Committee, ICAC prepared a revised project proposal which was presented to the Secretariat in December 1993 and subsequently discussed by the Committee during its Ninth Meeting in February 1994. The Committee agreed with the objectives, scope and the design of the project. It also concluded that the project falls within the strategy of the sponsoring ICB and is in accordance with the objectives and mandate of the Fund. The Consultative Committee recommended that the project proposal be finalized noting the views of the Consultative Committee and submitted to the Executive Board for consideration and approval. The comments of the Ninth Consultative Committee relate to: the need to spell out the project management and monitoring arrangements; indicate clearly the dissemination arrangements; personnel costs to be re-examined and the basis of estimation in the participating countries spelt out; and inclusion of financing plans. These comments have been reflected in the final project document.

B. Overview of the Commodity and the Related Background¹

¹ See Appendix I for basic commodity data.

3. Production and Demand - Cotton ginned lint as an agricultural raw material commodity is a major export crop in both the developing and developed countries whereby the latter accounts for about 55 percent of the world's output. In the developed countries, five countries (USA, Canada, Greece, Australia and Spain) account for about 90% of the production from that group. Among the developing countries, nine countries (India, China, Pakistan, Egypt, Brazil, Mexico, Sudan, Turkey and Khazakstan) account for about 60% of the production. Based on the average of the last three years' figures, cotton is one of the few major commodities whose global production more or less match world mill consumption. However, increases in output are expected during the last half of this decade. Most of the increases would be from the USA, India, Pakistan, Australia, Argentina, China, Brazil, Egypt, Turkey and the Central Russian Republics.

4. The cotton market is dominated by major consumers, with China accounting for about one-fourth of the world's mill consumption. Other major buyers of cotton are South Korea, Taiwan, Japan and the EU, with USA coming out as a net exporter despite its high mill consumption.

5. Compared to cotton producers in the developing countries, cotton producers in the developed countries, particularly the United States, which accounts for about 10 percent of the global production are in a best position to react to changing market trends. They adjust their output by using a range of instruments and farm policy measures. The main instruments used include an efficient farming system backed by an advanced distribution network and marketing system; post-harvest technology, modern information and telecommunications systems; and more importantly, a flexible Farm Bill which regulates output through a system of production ceilings backed up by price support.

6. Current Prices and Prospects - The major market for cotton trading is the New York Commodity Exchange. Prices in this market serve as reference for other centres of cotton markets. As at 25 January 1994, the New York Commodity Exchange settlement price for March cotton was quoted at US\$ 0.7306 per pound at 50,000 pounds lot size on heavy volume of trading. One year projection based on the futures market indicates a relatively firm market with only a 4 percent price differential for March 1995 cotton, with a less than one cent spread between bid/ask quotations. Cotton supply and demand are highly price inelastic, with price elasticity ranging from -0.02 in India to 0.33 in the Republic of Korea (South), that is, higher for NICs and lower for developing countries. Even for countries with large farm sizes like Australia and China, the elasticity values are -0.06 to -0.08, respectively.

7. The world stocks have been relatively stable around 9 million tonnes in the past three years. It is projected that the cotton stock in the next two years will increase by another 3 million bales (653,000 tonnes). A continuing decline in petroleum prices, as witnessed in 1993, will increase the competition from synthetic fibres. The expected decline in cotton prices resulting from increased supply and growing competition from synthetics, calls for, inter alia, measures to improve quality and reduce cost of production. 8. The ICAC Involvement and its Roles - The members of the International Cotton Advisory Committee (ICAC) in 1988/89 accounted for

about 82.1 percent of the world cotton exports and 55.1 percent of the world cotton imports in 1988/89. The commodity development strategies of ICAC include promotion of producer/consumer cooperation as well as the encouragement of the transfer of technology, diversification and productivity improvement. ICAC expects cotton production and crop income prospects in the nineties to be linked to yield improvement and intensification, rather than crop area expansion. Thus, ICAC supports diversification, as part of its development strategy. It, therefore, encourages the development of cotton-related processing, particularly in the rural areas and promotes productivity through quality improvements and technologies aiming at reducing production costs. The ultimate aim in developing countries and particularly the least developed ones among them is to provide employment opportunities for men and women in the rural areas, particularly during the off-season, with a view to providing more stable incomes and to enhance cash returns for rural households. In order to achieve this objective, vertical diversification involving processing of cotton, and its by-products in the rurals will be given necessary attention.

9. Trend in Production and Value Obtained by Producing Countries - Cotton farming systems are extremely varied around the world - from labour intensive smallholder producers in low-income countries to highly capital intensive corporate and commercial estates in developed and some developing countries. Further, due to fairly wide-spread vertical integration in the cotton sector, it is less meaningful on the average, to separate benefits by primary and secondary producing countries. However, certain observations can be made. In the developed and many developing countries with mechanisms to adjust supply to market demand and with capacities to produce basic inputs of production, the production and value obtained are expected to be positively correlated. In the LDCs and some developing countries which are mainly primary producers and which depend on imports for inputs, there has been a general tendency for a negative correlation between outputs and values obtained. This trend is particularly noticeable in cotton producing countries in Africa, e.g. Benin, Côte d'Ivoire, and Mali. These countries have reacted to low world market prices by making structural adjustments in production (horizontal diversification and to a limited extent vertical diversification), productivity enhancement through adoption of better technologies; and introduction of incentive policy framework.

10. Project Related Institutions - The International Cotton Advisory Committee, which is the sponsoring agency, will be the supervisory body. ICAC has its headquarters in Washington, D.C., USA. It has capacity and resources to assume the project supervisory role. The Project Executing Agency (PEA) would be the Israel Cotton Production and Marketing Board Ltd. (ICPMB). This agency, comprising of a Board as the policy making organ, and four Divisions, has overall responsibility for policy development and for the promotion of cotton production in Israel. ICPMB is headed by a Managing Marketing Director. It is, therefore, well placed to oversee project implementation. It will entrust the direct implementation to the Tel Aviv University which would be the lead agency in research and development, and the Ministry of Agriculture, which will undertake and coordinate trial demonstrations and extension programmes. Both the Tel Aviv University and the Ministry of Agriculture have suitable infrastructure and experienced staff to support the various activities they will undertake under the project.

11. Collaboration will be obtained from Egypt, Zimbabwe and Ethiopia. The cooperating institution in Egypt will be the Plant Protection Research Institute (PPRI) which will be involved in research and development programmes as well as trials and demonstrations. The Entomology Department of PPRI, which will be specifically charged with the responsibilities under the project, has adequate facilities and staff to support the project. Only field trials and

demonstrations will be undertaken in Zimbabwe and Ethiopia. In Zimbabwe, the Cotton Marketing Board (CMB) will be focal point for project support. The CMB will seek support from the Cotton Research Institute (CRI) as may be necessary. Both the CMB and the CRI in Zimbabwe have basic infrastructure and staff to support the project. The facilities for cotton production in Zimbabwe are also being upgraded by an on-going project supported by the World Bank and other donors. In Ethiopia, the Institute of Agricultural Research will be the collaborating institution. This institution has already collaborating agreements with Israel in cotton development and its staff has been receiving training in this respect in Israel.

12. Previous Assistance to the Commodity/ICAC - Support to the commodity and to the ICB is limited to only one project, "Study of Cotton Production Prospects for the Nineties". The assistance represents 3.6% of the existing commitment of the Fund. The implementation of the project is so far satisfactory. The designated ICB sponsoring this project, the International Cotton Advisory Committee, is known to the Secretariat as a well-respected, professional organization. The experiences of the Secretariat with ICAC in supervising project implementation, although limited, is satisfactory and does not indicate the need for any specific, additional measures/guarantees in that regard.

PART II. PROJECT DESCRIPTION

A: Project Rationale and Objectives

13. Cotton is a major field crop in many countries, constituting a valuable cash crop for many smallholders in developing countries. It is an important industrial crop in both developed and developing countries. The single most important limiting factor for raw cotton production is cotton plant pests of which the sweetpotato Whitefly (*B. tabaci*) and the cotton aphid (*A. gossypii*) are very important. Both pest species excrete sticky honeydew while feeding on the cotton leaves. This sugary material accumulates on the leaves and on the cotton lint. On the leaves, it serves as a substrate for the growth of black "sooty mold" fungi which covers the green leaf surface and forms a physical barrier preventing light from reaching the leaf surface, thus greatly reducing the plant's photosynthetic rates. Once on the lint, both honeydew and sooty mold are contaminants causing the lint to be sticky and discoloured. Thus, they are highly undesirable products in the textile industry. In addition, these pests cause reduction of yield levels and quality in many cotton producing countries.

14. In many countries, toxic chemical control methods are the only control measures for these pests. The use of toxic chemicals has proved hazardous to both humans and the environment. This is particularly so in developing countries and among smallholders where application methods are not under proper control, and level of awareness is very low and, therefore, exposure rates are high. Pesticides used in cotton contribute 6 - 10% of the global pesticide sales, and represents on an annual basis about 150,000 to 250,000 tons of active ingredients mostly in the form of insecticides and acaricides. In cotton-producing developing countries, cotton pesticides constitute the major use of agricultural chemicals (Turkey 36%, India 45% and Egypt 50% of all pesticides used in agriculture). The World Health Organization (WHO) estimates in millions the number of workers poisoned by insecticides, about a quarter of them are due to cotton-spraying. Many cotton pests have developed resistance to pesticides.

Many natural enemies of cotton pests as well as for other crops have been destroyed by cotton pesticides and this has resulted in increased pest attacks not only on cotton but also on other crops. The proposed project would develop vegetable oil based chemicals and suitable equipments for their application to address the problems of the use of toxic chemicals. Cotton may in future face stiffer competition from synthetics; therefore, efforts aiming at raising productivity, improving quality and reducing costs, are important to improve market competitiveness of cotton and to raise income of producers. Considering the problems of growing market competition from synthetics, there is an urgent need to develop least cost and quality enhancing technology, target oriented, environmentally compatible chemicals as well as suitable biological control methods for the control of these key cotton pests. These are part of the subject matters for the proposed project.

15. The objectives of the proposed project are to improve farmers' income through improvement of yields and quality of cotton; and to protect the producers and environment. These objectives would be met through the development of save, low-cost less-toxic chemicals and biological methods for the control of the two most important cotton pests. Guidelines for technical and economic control as well as application methods will also be developed and disseminated.

B: Description of Project Components

16. This four-year project would comprise of five main components: (a) development of new target-oriented, environmentally compatible pesticides; (b) improvement of insecticide application methods; (c) utilization of biological control methods; (d) establishment of appropriate economic thresholds for the new methods; and (e) development of guidelines for a control policy, and dissemination of the new techniques.

(a) Development of New Target-Oriented Pesticides

Increasingly, vegetable oils are used as alternatives for neuro-toxic insecticides. Recently, vegetable oils of various types have been shown to effectively control several cotton pests including, *B. tabaci* and *A. gossypii*. Detailed laboratory and field trials by the ARO have suggested that the high efficiency of several vegetable oils derives from their combined activity as behaviour modifiers and lethal agents on various developmental stages of the pest. Thus, an optimization of the formulation-application of vegetable oils is a pre-requisite to guaranteeing consistency of the field performance. The proposed project will develop such vegetable oil formulation. In addition, an important group of detergent-based insecticides has been added after it has been used effectively against aphids on citrus and on cotton. The project will develop target oriented, novel insecticides that are based on plant oils as well as detergent and surfactant based materials like the aphicide Nat-B, and, the whitefly-oriented LQ-215, and new materials that are presently being developed, will be incorporated. For example, the properties of LQ-215 include absence of human or plant toxicity, and the rapid and efficient killing action of young whitefly immatures provided complete plant coverage by the material is achieved. These make it particularly suitable for use in developing countries and with smallholders, who following the development of the appropriate application techniques (see paragraph 16 b) will be able to get the desired plant coverage.

Main activities would include: rating of vegetable oils and detergents according to their potency as pest control agents; assessment of bio-activity of different types of vegetable oils and detergents on whitefly under laboratory condition, as model targets for the selection of formulations of the most promising oil and detergent types; primary field tests in micro-plots; field trials of selected vegetable oil and detergent formulations in Israel and Egypt to test optimizing application mode, spray equipment, dosage, spray timing and frequency, compatibility with other control measures as reflected by the effect on population of cotton pests and their natural enemies, refinement of formulation in line with identified requirements of the target farmers in Israel and Egypt.

(b) Improvement of Insecticide Application Methods - Design and Production of Prototype Sprayers and Equipment

Insecticide application methods will be improved through a modification of the existing equipment and development of new sprayers. The general insecticide application methods are based on boom-spraying from ground or aircraft. The deposited chemical values are reduced with increased depth into the canopy. The underside of leaves are poorly covered. Several methods, including boom drops and air-carried sprays, have been tested to improve undercover deposition with little effect. Application of electrically charged drops has also been tried in cotton-pest control but has not been found economically feasible. A peripheral air-blast sprayer, a concept which combines a boom-drop with a pulsating air carrier stream has been developed for citrus spraying and has also been used in tomatoes as a pollinating apparatus. The principle has been adopted to a boom-drop sprayer and tested successfully with even spread of chemicals on 120 cm high cotton. The proposed project would define design criteria for a cotton sprayer based on a pulsating air-carrier concept. Based on these criteria, a high capacity cotton sprayer utilizing a pulsating airstream concept to carry the spray cloud into the plant canopy will be developed. This will be an experimental air-assisted sprayer, with wide options for air speed, air direction, pulse frequency, and spray nozzles (types and placement). Different nozzle designs and sprayer modifications for back-pack low volume sprayer will be developed. The sprayers would be tested and their efficiency will be evaluated technically and economically. The results will be used to design and produce a prototype for a commercial sprayer.

(c) Utilization of Biological Control Methods

The proposed project would identify the major natural enemies of cotton pests (whitefly and aphids), encourage their activities and explore ways to protect them from hazardous effects of insecticides. It will also attempt to enhance the activity of natural enemies through various agrotechnical methods. The efficiency of the natural enemies will be studied under different conditions. Main activities will include surveys of natural enemies of whiteflies and aphids in Israel and Egypt; determine the availability of additional enemies in other countries; examine the efficiency of natural enemies in controlling whiteflies and aphids; determine the effects of common insecticides and new ones upon the enemies in the laboratory and the field; draw-up plans to conserve and multiply natural enemies; and integrate the use of natural enemies with other methods

according to pre-determined activity thresholds.

(d) Establishment of Appropriate Economic Thresholds for the New Methods (Determination of Techno-Economic Threshold)

Cotton pests have been known to exhibit exponential growth within a season. A low number at the beginning of the season may grow up to uncontrollable masses later. Therefore, the controlling strategy and the control thresholds must intervene in the population at the appropriate time to prevent build-up. Thresholds would be determined by allowing the pest to form outbreaks of varying magnitudes and studying their effects on crop quality and quantity, and determine at what stage it is necessary to intervene to prevent the manifestation of stickiness and damages. Such thresholds will be determined in the presence of natural enemies and/or the utilization of chemicals. On the basis of various thresholds, a cost-benefit chart would be developed for different conditions, regions, and different cotton production systems. The efficiency of chemicals and natural enemies to depress the insect attack below the economic threshold will be determined.

(e) Development of Guidelines for a Control Strategy, Training and Dissemination of New Technologies

Based on the results of the various trials and threshold determinations, guidelines will be developed for control strategies that can be used under various environmental conditions, crop-culture methods and pest situations. These guidelines would be applied in the participating countries and results evaluated. A comprehensive optimum strategy for effective control under different situations would be developed. Technology dissemination will be promoted by active involvement of staff from participating countries in the process of technology development, trials and demonstration involving extension staff and farmers. Training would be provided for staff from the participating countries (Egypt, Zimbabwe and Ethiopia), and other major cotton producers in Africa (Mali, Benin, Côte d'Ivoire and Nigeria). On-the-job training would be provided to extension officers of the participating countries. Technology dissemination will also be promoted through two workshops, one in the second project year (PY₂) and the other six months to the end of the project. Apart from the participating countries, other interested countries would be invited to participate.

C. Benefits

17. A successful development of new methods of cotton pest management and their subsequent adoption, will result in increased productivity and improved income for farmers, better quality cotton for industries and positive environmental impact. According to recent estimates, losses incurred through poor cotton lint quality and reduction in yield caused by cotton pests can run into 40 - 50% of the potential yield. Whereas large commercial producers can reduce their losses substantially through chemical spraying but at a high cost and damage to the

environment, the smallholders will suffer losses close to the above estimate either because of limited use or inappropriate use of chemicals. They also will suffer from exposure to toxic chemicals apart from polluting their environment. Production of cotton in Pakistan declined 30% from 2.1 million tons in 1991/92 to 1.5 million tons in 1992/93, due entirely to an infestation of the whitefly. During 1992/93, with average international prices of cotton at 57 US cents per pound, Pakistan lost an estimated US\$ 800 million dollars of direct production or 1.6% of GDP in 1992. A decline in yields from 769 kilogrammes per hectare in 1991/92 to 555 kilogrammes in 1992/93 in Pakistan, shows a potential loss of about 30% income per hectare due to whitefly in any country. ITMF reported in 1988 that a survey of textile mills indicate a discount of 10% or more on the price of sticky cotton compared to non-sticky cotton. The development of IPM including the use of less-toxic insecticides and biological control will assist in minimizing production cost. The cost of less-toxic materials to be produced is expected to be lower than the existing toxic chemicals, because of their innate efficiency and their compatibility with the activities of natural enemies. Empirical evidence from pilot trials has indicated that the number of sprays against the key cotton pests can be reduced by about 50 - 60% when IPM approach is adopted. The cost of pest control can be reduced by about 50% implying a reduction in total production cost by about 10%.

18. Environmental protection will be enhanced by a considerable reduction of the use of toxic materials. It is expected that if the IPM is successfully developed and widely adopted, the use of toxic chemicals for cotton crop production can be reduced by about 50 - 60% in the long-run. The hazards to producers will equally be reduced.

19. Through its training and dissemination efforts, the project would improve the staff capacity of cotton producing countries. LDCs will receive a special focus under the project in this respect. Technological development involving simple processes of chemical formulation, use of locally available vegetable oil, and the production of new types of sprayers may provide a basis for vertical and horizontal diversification which will improve benefits to producing countries as well as improve employment opportunities, particularly in LDCs.

20. The technologies to be developed will have global application and will assist in improving the competitiveness of cotton. Quality improvement and production cost minimization will in a way positively influence market stability.

D. Project Target Beneficiaries

21. This research and development project aims primarily at the development of environmentally and economically sustainable methods of cotton crop protection and at demonstrating their usefulness on the field. The IPM methods that will be developed will be accessible to all cotton producers, however, the technology will be more suited for adoption by smallholders. The immediate beneficiaries will be the institutions of the participating countries and to farmers in those countries who will have the first contact with the technology. In addition to the four countries participating directly in the project, at least 20 countries (see Appendix III) where the pests to be addressed are already present, will be able to adopt the technologies once developed. Estates and commercial farms where *B. tabaci* has already developed resistance to ordinary insecticides, and smallholders using hand-held equipments in applying existing insecticides will be the main beneficiaries of the project output. Smallholders in developing

countries in particular will benefit from the project through better equipment and low-cost insecticides which are suitable to their cultural practices. They also, can take a better advantage of the biological control methods to be introduced, as they can closely follow their plant-pest relationship and better manipulate pest levels. Positive benefits are also expected on smallholders with respect to other crops inter-planted, inter-cropped or mixed with cotton.

E. Project Costs and Financing

22. Total project costs over the four-year period are estimated at US\$ 5,390,270. Project costs are summarized in Table 1 below.

Table 1
Project Cost Summary
(USD 000)

Component/ Sub-component	Total	Component as % of Base Cost
A. Development of Targetted Pesticides	1171.49	21.73
B. Improvement of Application Methods - Design and Production of Prototype Sprayers and Equipment	748.17	13.88
C. Biological Control	1612.11	29.91
D. Determination of Techno-Economic Threshold	1068.91	19.83
E. Development of Guidelines - Training and Dissemination	789.59	14.65
Total	5390.27	100.00

23. Financing: Project costs would be financed by a Fund's grant of US\$ 3,074,620 and contributions from Israel and Egypt in the equivalent of US\$ 1,910,190 and US\$ 380,710 respectively. Ethiopia and Zimbabwe would also contribute the equivalent of US\$ 11,000 and US\$ 13,750 respectively and mainly in kind. The summary of the proposed financing is reflected in table 2.

Table 2
Financing Plan
(USD 000)

Component	CFC	Israel	Egypt	Zim- babwe	Ethiop ia	Total
A. Development of Tropical Pesticides	470.39	701.1	---	---	---	1171.49
B. Improvements of Application Methods Design and Production of Prototype Sprayers and Equipment	473.94	274.23	---	---	---	748.17
C. Biological Control	932.43	502.68	168.00	5.0	4.0	1612.11
D. Determination of Techno-Economic Threshold	592.53	346.38	121.00	5.0	4.0	1068.91
E. Development of Guidelines - Training and Dissemination	605.33	85.80	91.71	3.75	3.0	789.59
Total	3074.62	1910.19	380.71	13.75	11.00	5390.27
% Financed	57.04	35.44	7.10	0.26	0.20	100.00

F. Procurement, Disbursement, Accounts and Audit

24. Procurement would be in accordance with the Fund's Regulations and Rules for the Procurement of Goods and Services of the Second Account. Equipments, vehicles and materials would be bulked as much as possible to attract International Competitive Bidding (ICB). Contracts costing the equivalent of US \$ 100,000 or more would be subject to International Competitive Bidding (ICB). Contracts costing less than US\$ 100,000 but more than US\$ 50,000

Equivalent of SDR 2,192,274.

would be procured through local competitive bidding satisfactory to the Fund. For contracts costing US\$ 50,000 or less or for specialized equipments, prudent shopping procedures with at least three quotations would apply. Consultancy contracts would be awarded following internationally acceptable guidelines with terms of reference, qualifications and conditions of service satisfactory to the Fund.

25. Disbursements: Disbursements against the purchase of vehicles, equipments, package of materials costing the equivalent of US\$ 1,000 or more and technical assistance services would be fully documented. Local staff salaries and allowances, operating expenses, training including workshop costs, and supplies would be disbursed against certified statements of expenditures (SOEs). Documentation for withdrawals under SOEs would be maintained in a central location by the PEA and collaborating institutions for review during supervision missions and for authentication by the auditors. Since the PEA and the collaborating institutions will not be in a position to prefinance expenditures eligible for Fund funding, a Project Account will be opened in a bank satisfactory to the Fund, and in convertible currency. The Fund would make an initial deposit of the equivalent of US\$ 300,000, representing an estimated six-months' worth of expenditures net of equipments and vehicles, and eligible for the Fund's financing. The Project Account would be replenished in accordance with the Fund's procedures and practice for operating a Project Account. The PEA would provide the necessary funds to the collaborating institutions from the Project Account in accordance with an agreed programme of work and budget.

26. Accounts and audit: All agencies participating in the project would keep independent financial records and accounts in accordance with sound accounting practices. The PEA will keep consolidated accounts for the project and prepare consolidated financial statements on a six-monthly basis and submit these along with the request for replenishment of the Project Account. The PEA will also prepare annual consolidated accounts. All project accounts, including the Project Account, shall be audited annually, except as otherwise agreed by the Fund, by independent auditors satisfactory to the Fund. The audited accounts and the auditor's report, including separate opinions on SOEs and the utilization of the funds in the Project Account, would be submitted within three months after the end of the related project's fiscal year.

G. Organization and Management

27. The Israel Production and Marketing Cotton Board (ICPMB) will be the Project Executing Agency and will thus be responsible for the overall coordination and implementation of the project. The project management including coordination of planning, budgeting, accounts, procurement, disbursement and monitoring of implementation progress will be assigned to the Production Division of the ICPMP. The project implementation will be based on an agreed annual work programme and budget consistent with the project document. The PEA, in close collaboration with the collaborating institutions, would prepare the draft work programme and budget including task assignments to be undertaken by the respective cooperating institutions. This draft work programme would cover in sufficient detail the activities to be carried out during the period by the respective collaborating institutions and the PEA. The programme will include a schedule of reporting by the cooperating institutions. The draft work-programme and budget will be cleared by ICAC, and made available to the Fund for review and comments, not later than two months before the start of implementation. The comments of the Fund will be incorporated in the final annual work programme and budget.

28. ICPMB would establish a Project Coordinating Committee (PCC) comprising the representatives of collaborating institutions and chaired by the head of the Production Division of ICPMB. The Project Coordinator in the Tel Aviv University will be the Secretary. The PCC will meet at least once every twelve months. The PCC will review and approve the annual work programme and budget, evaluate the progress of the project and advise on actions necessary to ensure the achievement of the project objectives.

29. The Production Division of the ICPMB will also be the lead agency in the implementation of the project in Israel. It will assume full responsibility for the overall management of the project in Israel and ensure coordination with cooperating institutions in participating countries. A project coordinator (Chief Entomologist) will be assigned for this purpose. The Tel-Aviv University will undertake the Research and Development activities and will collaborate with the Ministry of Agriculture in Israel for field trials, and demonstrations. The PPRI will manage the project in Egypt. PPRI will be involved in Research and Development, trials and demonstrations. The Cotton Marketing Board in collaboration with the Ministry of Lands Agriculture and Rural Development will manage the project in Zimbabwe while the Institute for Agricultural Research (IAR) will manage the project in Ethiopia. Activities in Ethiopia and Zimbabwe will be limited to trials and demonstrations. Each of the participating institutions would assign a coordinator who will be charged with the day-to-day management of the project.

30. The ICPMB will be responsible for arranging formal training for the staff of the participating institutions as well as organizing the workshops, in cooperation with CINADCO.

H. Monitoring, Reports and Supervision

31. The PEA will submit six-monthly progress reports and annual monitoring reports which will compare the project achievements with the set targets in the project document, highlighting the variances. These reports shall be made available to the Fund and ICAC not later than two months after the close of the reporting period. ICAC will provide the Fund with its comments on the report. A mid-term review meeting is planned for the end of the second year of the project to review implementation and recommend necessary adjustments as may be required to meet the objectives of the project. The PEA will submit, at the end of the project, a Project Completion report (PCR). The PCR will be submitted not later than three months after project completion. The PCR will be accompanied by a final project audit. As the sponsoring ICB, ICAC will undertake regular supervision of the project. The Fund will undertake a supervision mission at least once in a twelve month period. It will coordinate its supervision as far as possible with ICAC to avoid duplication of efforts. The Fund will also participate in the mid-term review meeting.

I. Risks

32. Achievement of objectives of the project will, to a large extent, be contingent upon the effective coordination of implementation of the research and testing activities in the four countries involved, namely Israel, Egypt, Ethiopia and Zimbabwe. This requires careful organizational arrangements including a clear schedule of planning process, reviews, consultations and the establishment of an annual work programme and budget by the PEA. In order to minimize this risk, the following measures have been included in the project design: ICPMB will set-up a PCC with the participation of the collaborating institutions; the establishment of this system and the approval of annual work plans and budget are conditions for disbursement. The Fund will monitor the project implementation on the basis of detailed work plans elaborated by the PEA. Another risk is that legal or policy difficulties could arise from collaborating countries. This risk is limited by the fact that the collaborating institutions have firmly confirmed their participation in the project. Further, the PEA will need to confirm, prior to the signature of the project/grant agreement, that the necessary official approvals from each country where the project is to develop activities have been received and that, based on those approvals, no formal difficulties are expected to be encountered in the implementation of the project. There is also the technical risk that the envisaged technologies will not materialize. This risk is minimized by previous work in Israel and other countries that have established the potential for developing such technologies.