Newsletter BERITA ISOPB

THE INTERNATIONAL SOCIETY FOR OIL PALM BREEDERS

PERSATUAN AHLI-AHLI PEMBIAK BAIK KELAPA SAWIT ANTARA BANGSA

P.O. Box 10620 KUALA LUMPUR.

Volume 1: No.2 December 1984 ISSN 0127-6581 KDN:1418/84

Editorial

In a recent conversation with Lockwood, an eminent cocoa breeder formerly with Cocoa Research Institute, Ghana, he lamented on the narrow genetic base of the current cocoa breeding and commercial planting materials; which were derived from a few plants from the rather limited Pound's collection. And in fact whether some of these selections were really from Pound's collection were even suspect But on hearing the story of the oil palm where the Deli duras presumably came from one bunch, the seeds of which found their way to Bogor, and the Yangambi and La Me pisiferas which were derived form a single palm in Eala and Bingerville respectively, he felt rather happy that the cocoa "boys" are in a better situation. It never ceases to amaze one to realise how the current varieties of most major crops can be traced to one or two genetic backgrounds. These imply that there must be a vast pool of genes available in the wild populations largely untapped which can give rise to super varieties! Either that or "early" men must have been very good selectionists! The narrow genetic base of current crop varieties have also been perpetuated by the reluctance of plant breeders, especially commercial plant breeders, to use wild materials or to use other genetic backgrounds, partly out of catering to consumer preference and partly out of sense of security and familiarity with using more advanced breeding materials. It generally took somewhat catastrophic conditions e.g. yield plateau and crown rust susceptibility in oats, Southern Corn Blight in maize, to [illegible] them to make such a move.

Oil palm is relatively a very new crop with systematic breeding being done hardly a few decades ago. Breeders [illegible] into this new crop, benefiting from experience with other crops, were well aware of the disadvantages and vulnerability of the narrow genetic base and advocated the widening of the germplasm which led to prospection in West Africa (for <u>E. Guineensis</u>) and Central and South America (for <u>E. Oleifera</u>) by various groups eg. IRHO, Unilever , NIFOR, OPGL, MARDI/PORIM, at various times within the last two decades.

The 1973 joint prospection by NIFOR and MARDI in Nigeria was the largest and perhaps the most systematic. The objectives of the prospection were for germplasm conservation and studying the genetic structure of natural populations which would guide in future prospections, in contrast to the other prospections made which were aimed at obtaining germplasm with more obvious or immediate commercial value. Whether subsequent prospections should take the former approach or latter approach will be a point of contention between the conservationists and the exploitationists. For one thing, the Nigerian prospection occupied a few hundred hectares using up most of PORIM's land which could otherwise be used for other breeding experiments. Secondly, the genetic structure of the natural oil palm populations in Nigeria can be assumed to be a single large continuous population which is presumably not the case in Zaire and Cameroon, which have distinct populations as was found in the recent PORIM prospection.

Maintenance of the germplasm collection is another consideration. Shall we maintain the palms as long as we can, and commit large acreages for a long time which could otherwise be used for other important breeding experiments? Or shall we keep a random or representative sample or quickly screen and select palms with desirable traits and destroy the rest? Alternatively the collections could be perpetuated by samples of bulked seeds. The choice is always a difficult one which is a delicate balance between risk of loss of valuable genes and the cost of maintaining unpromising materials. The development of efficient clonal propagation and cryopreservation techniques will of course ease this dilemma.

How best to utilize these prospected materials in breeding is also a very important question for breeders to contemplate. Shall we develop breeding populations independent of existing breeding populations or shall we concentrate on introgression of the wild populations into the advanced breeding populations? If we decide to develop separate breeding populations, which breeding method should we adopt? Shall we bulk and advance selfed or open-pollinated seeeds of mass selected palms as some form of simple recurrent scheme, or should the recurrent scheme involve some form of progeny-testing? Alternatively shall we just concentrate in developing distinct breeding lines by inbreeding?

If we decide to introgress, how do we decide which materials to be introgressed into the dura side and which to the pisifera side or perhaps we should not make this a constraint? If there are no obvious advantages or desirable traits in the wild materials, should we still introgress to generate genetic variability? Plant breeders, especially those in the private sector, are rather reluctant to introgress the wild materials unless the advantages are obvious firstly because they will be diluting the finely tuned genetic background of the advanced breeding with genetic "junk " and secondly it would not easy to convince their superiors of the advantage of such a cross although in the literature eg. oats, there has been instances of yield increases with introgression of wild materials.

So it seems there is quite a range of questions or issues to be resolved in this area of oil palm germplasm prospection, maintenance and utilisation. The forthcoming ISOPB/PORIM Workshop on "Oil Palm Germplasm and Utilization" will provide a forum to discuss and debate these issues.

So we hope to see you here in Kuala Lumpur and say your piece!.

Editorial Committee

Feature Articles

A. PORIM's Oil Palm Prospection in Zaire and Cameroon

Cameroon

Introduction

The objective of this collection is to sample the oil palm genetic material found in the natural palm groves of Cameroon and conserve them for future breeding programmes. In the past, some material has been collected in the Bamenda Highlands (Blaak) and IRHO prospected in the Western Cameroon but none was planted because of poor germination. However, no material has been collected in the Eastern part of Cameroon.

Materials and methods

Samples were collected at 32 sites distributed throughout Cameroon. One to 15 palms were sampled at each site. The sites and palms were chosen at random and the objective being as far as possible to cover the whole country. One bunch was harvested from each of the sampled palms and the fruits from each bunch were kept separate.

A total of 95 samples (58 _duras_ and 37 _teneras_) were

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collected in Cameroon. We despatched 19,000 seeds to Malaysia after the intermediate quarantine at Kew.

Observation

During this expedition, dense groves were noticed at Kendem, Widikum, Teze (Andek), Ngambe, Ayos, Obala and Nanga Eboko. The frequency of teneras is high at Widikum, Kendem and Teze areas; about 10%. In East Cameroon around Yaounde we sampled/observed and a large number of virescens duras but the frequency of teneras in this area was very low. We also noticed an idolatrica palm along the Edea/Douala road. There are a large number of palms around Edea and Ebolowa. But there are commercial palms in this area and we decided not to sample any material because of suspected contamination.

Results

For duras the bunch wt varies from 4.5 to 38.5 kg, mean fruit wt from 6.8 to 18.7 kg and mesocarp/fruit (%) from 3.7 to 61.8 kg. In the case of teneras, the bunch wt varies from 9.2 to 38.0 kg; mean fruit wt 5.1 - 16.2 kg and mesocarp (%) from 48.8 to 81.6 kg.

Zaire

Introduction

The main aim of the prospection is to sample the oil palm genetic material available in the natural palm goves of Zaire and to conserve them for future breeding and selection programmes. In early twenties and fifties, the Belgian workers prospected at limited places in Zaire on ad hoc basis. This is the first systematic prospection carrried out in Zaire, covering the whole country.

The collection was carried out with the cooperation of Plantation Lever Zaire (PLZ) and shared the cost and seeds.

Materials and methods

Samples were collected at 56 sites distributed throughout Zaire, i.e. Equator, Kivu, Kikwit -Kwango and Bas Zaire. At most of the sites 5 - 10 palms per site were sampled. A total of 369 bunches were sampled during the expedition, i.e. 283 duras and 86 teneras. A total of 73,800 seeds were despatched to Malaysia via Kew.

Results

The dura samples were analysed to study the distribution of variation at different levels i.e. areas, sites within areas and palms within sites. The following characters were analysed :-

1) Bunch wt.
2) Bunch length
3) Bunch depth
4) Bunch width
5) Stalk wt.
6) Fruit length
7) Fruit diameter
8) Nut diameter
9) Kernel diameter
10) Single fruit wt.
11) Single nut wt.
12) Stalk/Bunch wt. (%)
13) Mesocarp/fruit (%)

The first eleven characters have shown no significant differences between areas and sites within areas. The last two characters, stalk (%) and mesocarp (%) have shown significant differences between sites within area as indicated below:-

Anova

Items	df	Stalk (%) ms	Mesocarp (%) ms
Between areas	8	12.2 (NS)	276.1 (NS)
Sites within areas	41	88.3**	662.9**
Palms within sites	180	53.6	268.4

Rajanaidu N.

PORIM

B. Oil Palm Genetics Laboratory and Technical Liaison Committee

Oil Palm Genetics Laboratory (OPGL) was set up in 1963 with the aim of studying the genetics of the oil palm to provide the fundamental knowledge essential in breeding for higher yields. The OPGL was funded equally by four participating Malaysian organisations:- Dunlop (Dunlop Estates Berhad), Guthrie, Harrisons and Crosfield (now Harrisons Malaysian Plantations Berhad) and Pamol Plantations (Unilever). Dr. J.J. Hardon was engaged in November 1963 as the OPGL geneticist, based at the Guthrie Research Chemara, Layang-Layang. All the four participating organisations had agreed to locate trials on their respective estates if and when required. At the same time there would be a free exchange of information and materials among the research departments of the four participating orgnisations.

Significant improvements through breeding can only be realised if the populations utilised have sufficient genetic variability. Accordingly, securing a good collection of oil palm material to widen the genetic variabillity formed a major part of the OPGL programme. Materials subsequently introduced included seeds or pollen from Cameroon, Nifor, Bamenda, IRHO, Sumatra, Binga (Zaire), Pindi (Zaire), Ghana, Panama, Colombia and Costa Rica.

Genetical studies were also carried out to provide information on the inheritance of yield components in oil palms. Factorial and diallel crossing designs were adopted for four of these trials which were established on HMPB and Guthrie estates. As the trials were planted in two discrete environments, useful information on genotype-environment interaction would also be available. Data from these trials established by Guthrie Research, Chemara and HMPB - Oil Palm Research Station have already been analysed and published.*

* - Tan, G.Y. 1978. Genetic studies of some morpho-physiological characters associated with yield in oil palm (Elaeis guineensis Jacq.) Trop. Agric. (Trinidad) 55 (1) : 9-16.
- Ahiekpor, E.K.S. 1981. Genetic studies in some oil palm breeding populations in malaysia. M. Agr. Sc. Thesis (UPM).

Other basic studies were also carried out on methods of vegetative measurements, nursery selection, pollen storage, pollination, bunch ripeness, hormonal effects, and miscellaneous laboratory experiments. Dr. R.H.V. Corley, a plant physiologist joined OPGL in 1967 to undertake appropriate physiological investigations.

A Technical Liaison Committee (TLC) consisting of research personnel from all the four participating OPGL organisations, was formed to discuss matters arising from research projects within the OPGL. When MARDI was set up to undertake oil palm research in Malaysia, the activities of OPGL were phased out and most of its facilities were handed over to MARDI in 1973. However, all the former participating organisations agreed that the Technical Liaison Committee should continue to review the consultancy work of Dr. J.J. Hardon and implement any unfinished matters, especially the co-operative progeny testing programmes among the ex-consortium members.

The Technical Liaison Committee continues to function, meeting twice a year. Todate 44 TLC meetings have been held. Data from the OPGL trials are being analysed and will be published in due course. TLC members are also actively involved in progeny testing of selected pisiferas from the material introduced or exchanged by OPGL. An interspecific hybrid programme was also implemented by TLC recently and for the first time, non-TLC members (Sime Darby and Socfin) were invited to participate in this programme. It is hopeful that cooperation of this nature between TLC members and other research organisations will continue, especially with the advent of tissue culture, for the benefit of oil palm breeding in Malaysia.

Lee Chong Hee (HMPB), Tan Kiap Seng (Dunlop),
Law Ing Hock (Pamol) and Ong Eng Chuan (Guthrie)

Inventory

1. Indonesia

A. Public

1. Marihat Research Station
   Marihat, Pematang Siantar
   Sumatra

   Head : A. Lubis
   Breeder : Suhaimi Syukur

2. Balai Penelitian Perkebunan Medan
   P.O. Box 104,
   Medan, Sumatra.

   Head : Soepadiyo Mangoensoekarjo
   Breeder : B. Taniputra

B. Private

1. Socfindo Research Department
   Bangun Bandar, Sumatra

   Head & Breeder : T. Kusnadi

2. Bah Lias Research Station,
   Bah Lias, Sumatra

   Head : A.H. Bakri
   Breeder : F.X. Soebagyo

II Papua New Guinea

Dami Oil Palm Research Station
P.O. Box 165
Kimbe
West New Britain Province
Papua New Guinea

Telex NBPOD NE 93128

Telephone 93 5203/4

Division of Mosa Plantation Pty Ltd., New Britain Palm Oil Development Ltd.,

Managing Agents Harrisons & Crosfield (PNG) Ltd.,

Consultants Harrisons Fleming Advisory Services.

Dami OPRS was established by H&C in 1967

transferred to NBPOD in 1975

Research into density, nutrition, pollinating insects, pests, diseases etc was assigned to PNG Oil Palm Research Association in 1980.*

Agronomist in Charge	1968-1971	N.C. Mendham
	1971-1977	C.J. Breure
	1977-1982	C. Hellingman
	1982-1983	T. Menendez (Acting)
	1983-	H.C. Harries

Present Staff

Chief Agronomist/Plant Breeder	H.C. Harries
Seed Production Agronomist	J. Konimor
Plant Production Agronomist	T. Ovasuru
Trial Selection Agronomist	M.S. Powell
Station Manager	J.A. Balele

Aims

By breeding and selection to maintain and increase the quality and quantity of seed and clone production for NBPOD, for PNG and for export overseas.

* PNG OPRA has its Directorate located at Dami

Publications

Technical Record 1976-1982, 1982-1983 (restricted circulation)

Research Report 1968-1982, 1982-1983

Papua New Guinea Oil Palm Research Association
P.O. Box 97
Kimbe
West New Britain Province
Papua New Guinea.

Telephone 935203/4

Established in 1980 by the Papua New Guinea Palm Oil Producers Association and the Government of Papua New Guinea. Supported by a cess on production. The Directorate of Research is at Dami* with substations at Popondetta (Oro Province) and Bialla (West New Britain Province).

Present Staff

Director of Research	T. Menendez
Senior Entomologist	R.N.B. Prior
Agronomist	F.C.T. Guiking
Assistant Agronomist	P. Navus
Assistant Agronomist	P. Sereva Baiva
Visiting Pathologist	P. Jollands

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Aims

To enhance oil palm production at plantation, settler and village levels by carrying out research into agronomy, physiology, nutrition, entomology and pathology.

Publications

Annual Reports 1981, 1982, 1983

* The OPRA Directorate is situated at the Dami Oil palm Research Station where New Britain Palm Oil Development Ltd carry out breeding and selection for seed and clone production.

* Editor: H. Harries was a well known coconut breeder in W. Indies and Thailand before venturing into oil palm, while T. Menendez was a well known oil palm breeder in NIFOR.

III. Nigeria Institute For Oil Palm Research (NIFOR)
Private Mail Bag 1030, Benin City,
Nigeria.

Director (Acting) ; Ataga, D.O.
Breeders:Okwuagwu C.O.(Ms) - Main breedeng and selection programme, quantitative variation

Parimoo, R.D. (Ms) - Short stem programme, mutation breeding and cytogenetics

Ataga, C. - Graduate student, germplasm utilization

Opeke B. (Ms) - Graduate student, quantitative variation

IV. Unilever PLC Plantations Group

a) Unifield T.C. Ltd.,
Unit 1 St. Martin's Way Industrial Estate
Cambridge Road,
Bedford MK42 OLG
England.

Director : Corley, R.H.V.

b) Plantations Pamol Dv. Cameroon Ltd. B.P. 5489
Akwa, Douala,
Cameroon

Breeder : Cundall E.P.

c) Plantations Lever an Zaire
S.A.R.L.
B.P. 8611 Kinshasa 1.
Zaire

Breeder : de Greef W.

V. Institute de Recherches pourles Huiles et Oleagineux (IRHO)

a) I.R.H.O. Headquarters
11, Square Petraque,
75016, Paris,
France.

Director of Research : Ollagnier, M.
Director of Oil Palm Development : Wuidart, W.

b) I.R.H.O.
Department Selection, GERDAT
B.P. 5035,
34032, Montpellier, Cedex
France.

Breeders : Gascon J.P.
Noiret J.M.
Meunier, J.

c) I.R.H.O.
Service Selection de la Station de La Me
B.P. 13, Bingerville
Ivory Coast

Breeders : Jacquemard J.C.
Baudoin
Ahizi P.

* Editor : The above inventory was compiled to the best of our current knowledge. Organizations concerned are requested to submit corrections or changes and omissions.

NEWS

I. International Board For Plant Genetic Resources (IBPGR) Working Group Meeting on "Oil Palm Genetic resources", 19-21 Sept. 1984, at FAO, Rome, Italy.

The IBPGR sponsored meeting was held for the following objectives:-

1) To review existing collections.
2) To identify priority areas for future collections.
3) To formulate collection methodology.
4) To discuss conservation methods.
5) To develop a descriptor list for oil palm.

The Committee consisting of Dr. R.H.V.Corley, Mr. J. Meunier, Dr. J.C. Nascimento (Brazil), Dr. C.O. Okwuagwu (Nigeria) and Dr. N. Rajanaidu (Malaysia) have recommended the following:-

1) Priority areas for future collections:-

<u>E. guineensis</u>

a) Angola

b) Zaire (certain parts not covered by present collection).

c) Lake Tanganyika region.

d) Congo and Gabon.

e) Ivory Coast (studied by IRHO but no systematic collection for conservation).

f) Brazil (Bahia region).

g) Gambia, Ghana, Guinea, Liberia, Senegal, Sierra Leone and Madagascar.

<u>E. oleifera</u>

a) Venezuela

b) Brazil, the Guyanas and Suriname.

2) <u>Collection methodology and sampling strategy</u>

PORIM studies on the genetic structure of natural populations indicate that nearly 25% of the total variation is due to population differences.

The variation due to palms within a population (site) accounts for less than 10% and within seedling variation about 65%. The latter includes both the genetic and environmental components and studies show that both these components are equal in magnitude.

In addition to the above, the results show that the samples collected from drier regions tend to have lower mean and variance.

Based on the analytical studies above, the Working Group agreed that the collection strategy should always be to capture maximum genetic variability and this can be done by sampling the whole range of ecological niches. In the case of oil palm, 5 - 10 plants per site (population) is sufficient to capture available variability. However, the Group suggested that sampling of populations (sites) should cover all ecological niches and especially, peripheral regions.

3) Conservation

Conservation methods in oil palm work are currently limited to field gene banks. The group noted that field genebanks are extremely useful because evaluation of the materials are continuously carried out.

The Group suggested that at least 10 seedlings per progeny or 100 seedlings per population should be in the field genebank to maintain varibility. The Group also noted that the regeneration of the collections must be carried out every 30 years and suggested that random pair-wise crosses should be made within a population in order to maintain the genetic integrity.

The Group further suggested that PORIM collection in Malaysia should be considered as "Universal Collection" and the collections in Ivory Coast and Brazil could serve as duplicate repositories.

The benefit of in situ conservation, especially in Africa is appreciated by the Group and it was agreed that conservation by means of field genebanks would be adequate for the forseeable future. Before in situ is considered, more field work is necessary to determine if there are truly wild populations (most are associated with habitation).

Nigerian Genetic Material

A comprehensive report on Nigerian genetic material is being prepared and will be presented at the forthcoming Workshop on 'Oil Palm Germplasm and Utilization" organised by the International Society for Oil Palm Breeders (ISOPB) and PORIM on 25-26 March 1985.

Rajanaidu N.
PORIM

II. Fusarium Wilt Tolerance

According to Corley, R.H.V., in collating the results of the oil palm breeding experiments in the research stations in West Africa belonging to Unilever Plantation Group, they discovered that progenies having the Dumpy (E.206) lineage consistently manifested tolerance or resistance to *Fusarium* wilt. It would be interesting to speculate how this resistance could have evolved in the Dumpy palm as the Dumpy palm originated in Malaysia, where Fusarium wilt is non existent. Perhaps it is not a case of true resistance.

It is also interesting to note that the Dumpy palm has been alleged to be particularly susceptible to *Ganoderma* from observations on highly inbred progenies of the Dumpy. Soh, A.C. in Planter 57, 1982 implied that it might be the case of the poor vigour of the inbred Dumpies rather than inherent suceptibility. Some breeders in the Far East have suggested the introduction of *Fusarium* wilt tolerant progenies from W. Africa which hopefully may also confer tolerance to Ganoderma. If the alleged inherent susceptibility of Dumpy palms to Ganoderma and the observed tolerance of Dumpy palms to Fusarium wilt are both true, then resistance to both diseases must be inherited independently. The only way to resolve this is by more objective tests or experiments.

III. International Cocoa and Coconut Conference

During the recent above conference, coconut tissue culturists hailed the purported success of Indian researchers in their ability to obtain embryoids directly on the explants without the use of 2-4,D and coconut plantlets were subsequently regenerated form these plantlets.

Tan, Geok Yong, formerly oil palm breeder with Chemara, was present at the Conference. He is now a consultant cocoa breeder in Papua New Guinea.

IV. Some Old Some New

The 10th EUCARPIA (European Association for Research or Plant Breeding) Congress was held in June 1983 at Wageningen. The Netherlands was an unexpected meeting place for some old (non-practising) and some new (practising) oil palm breeders. The practising oil palm breeders present were : Jacques Meunier (IRHO, France), Mary Liang Ngui (Dept. of Agr. Sabah), Tan, Swee Tian (Ebor Research, Malaysia), Soh, Aik Chin (HRU, Malaysia).

Yap ,Thoo Chai, Professor of Plant Breeding at the Agricultural University of Malaysia who is also associated with oil palm breeding, was also present as a representative of SABRAO (Society for the advancement of Breeding Researchers in Asia and Oceania). The nonpractising oil palm breeders present were:-

J.J. Hardon : formerly breeder and geneticist at OPGL and Chemara.
Presently Director Gene Bank, DLO,
Directorate for Agriculture Research
Mansholtlaan 4 , Wageningen, The Netherlands.

L.D. Sparnaaij : formerly breeder at NIFOR. Presently carnation and ornamentals plant breeder at IVT, P.O. Box 16, NL-6700 AA Wageningen, The Netherlands.

H.A.M. Van der Vossen : formerly oil palm breeder in Ghana.
Presently commercial breeder at Slius Groot B.V.
P.O. Box 13, NL-1600 AA Eukhuizen
The Netherlands.

V. <u>Evolution Anyone?</u>

Parents with preteen and teenage children have another two more sci-fi fairy tales with contemporary anthropocentric themes i.e. Sex and Drugs, besides the Cataclysm Theory to explain the extinction of the monster reptiles, the dinasaurs. The Sex Theory postulated that with the increase in global temperatures at the end of the Cretaceous period, the dinosaur with their poor surface area to volume, could not cool down fast enough. The testes, which need cooler temperatures, was embedded in the body (in contrast to mammals, the testes of which are outside the body) failed to function leading to mass sterilization and death of the species. Surprisingly this theory, proposed in 1941 by Cowles has some credible basis, arising from studies on the alligator. In the Drugs Theory, flowering plants, many of which contained psychotic chemical compounds, just appeared during the end of the great reptiles reign. It was speculated that the great beasts O.D'd (overdosed) on these vegetation because they could not taste their bitterness nor have livers capable of detoxifying the drug substances. Guess who propounded this theory? A psychiatrist!.

The Cataclysm Theory is the most plausible but there is still some controversy surrounding the actual cause of the cataclysm, with Nobel laureate, Alvarez, blaming it on a giant asteriod colliding with earth while others attributed giant volcanic eruptions, both resulting in clouds of dust, blocking sunlight and suppressing photosynthesis and lowering temperatures.

Anyone wishes to speculate on the origin of the oil palm? The curious thing pertaining to the oil palm origin, is that there is one species of oil palm in Central & South America and the other in West Africa, without traceable wild or near relative in either place. A recent speaker proposed Gwondoland, the landmass which presumably joined the Atlantic coasts of America and West

Africa before they drifted apart leading to the disappearance of Gwondoland and the oil palm progenitors or ancestors with it. Those of us brought up on Tarzan and Edgar Rice Burrough's comic strips will immediately conjure up images of Tarzan wrestling and battering the ferocious sabre tooth tigers and giant mastodons in the primaeval jungles when the magical word "Gwondoland" is uttered. In all fairness, this speculation is not entirely out of line as Zeven did speculate that the oil palm originated on the African part of the tertiary landridges separating Africa and South America.

How do we account for the persistence or survival of the reproductively unfit, homozygous recessive _pisifera_ and the low representations of the dominant _virescens_ and mantled fruit forms? As for the persistence of the _pisifera_ or shelless allele one possibility is that the mutation occurred in recent times for modern man to prefer and select the _tenera_ thus conferring the _tenera_ heterozygote fitness and protection of the shelless allele from genetic death.