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USO DE INSETICIDAS BACTERIANOS PARA O CONTROLE DE CULICÌDEOS E SIMULÍDEOS NO RIO GRANDE DO SUL.

Antonio Ruas Neto & Sydnei Mitidieri Silveira. Serviço de Controle de Vetores e Zoonoses. Secretaria de Saúde e do Meio Ambiente.90030. Porto Alegre, RS. BRASIL.

A utilização de inseticidas baseados nas endotoxinas produzidas pelos agentes Bacillus thuringiensis var. israelensis e B. sphaericus cepa 2362, vem sendo investigada quanto à contribuição para as operações larvicidas no controle integrado de culicídeos e simulídeos no Rio Grande do Sul. A utilização de larvicidas químicos, ainda largamente empregada, tem como principais dificuldades o custo, impacto ambiental e toxicidade a curto prazo, bem como resistência a longo prazo.

Nos programas de controle de culicídeos(especialmente Culex quinquefasciatus Say) utiliza-se deltametrina,fenthion e temephos, dos quais o primeiro agente é mais usado, sendo eficaz em vários tipos de focos à 5mg/m². Formulações de B. sphaericus vem sendo testadas com sucesso em laboratório. Como padrão, tem sido usado o ABG 6234-Abbot que produziu 0,07 e 0,31 ppm de CL_{50} e CL_{90} respectivamente em 48 horas nos bioensaios, além de um aumento progressivo da mortalidade após este período. Esta formulação mostrou-se também eficaz em água de criadouro filtrada, com 0,09 e 0,37 ppm (CL_{50} e CL_{90}/48 horas) e "in natura" (94,8% de mortalidade com 5 ppm em 10 litros), embora neste caso sofrendo uma aparente influência das partículas orgânicas em suspensão. Produtos locais também vem sendo testados,com meios diversos de cultivo. Com um substrato de soja, altamente enriquecido, conseguiu-se um efeito máximo de 0,04 ppm(CL_{50} em 24 horas) num pequeno volume.Em fermentador de volume maior, conseguiu-se 1,34 ppm(CL_{90} de 48 horas) e em água de criadouro com elevado teor de matéria orgânica,84,5% de mortalidade a 5 ppm em 12 litros.Os resultados indicam que a utilização destas formulações será provavelmente eficiente em sistemas fechados, restando ainda uma melhor avaliação das influências físicas sobre o seu efeito. A possibilidade de produção local neste contexto, pode ainda elevar a eficiência pela redução do custo do material.

No caso dos simulídeos(especialmente Simulium pertinax Kollar, 1832) utilizou-se com sucesso em até seis municípios, duas formulações de B.t.i(VECTOBAC- Abbot e TEKNAR-Sandoz) em cerca de 37 cursos d'água, com reduções amplamente satisfatórias(>90%) na faixa de 0,17 a 20m³/min de vazão e concentrações de 12 a 50 ppm/min. A espécie alvo é tolerante ao temephos, o que restringe o programa às formulações biológicas. As estimativas de custo por cobertura indicam uma elevada eficiência neste caso. Estuda-se também a possibilidade de introdução de formulações locais.

AUTOLYTIC INDUCTION OF PROTOPLASTS IN **B. thuringiensis**: TRANSFORMATION AND INTERSPECIFIC FUSION

Clara P.Rubinstein and Carmen Sanchez Rivas
Instituto de Investigaciones en Ingenieria Genética y Biologia Molecular (INGEBI), Buenos Aires ARGENTINA

Bacillus thuringiensis is a Gram positive sporeforming bacillus which produces parasporal inclusions with the ability to kill insect larvae upon ingestion.
Currently, there is an enhanced interest in these bacilli because of their potential in bioinsecticides production. The lack of efficient methods for genetic manipulation, howewer the development of genetic as well as physiological studies. Several laboratories have enterprised the study of the genetic determinism and the regulation of **the** larvicidal cristal synthesis. In this sense,techniques such as plasmid DNA transformation, mutagenesis and inter-specific fusion would be of great help to these studies.
We have undertaken the development of such techniques in our laboratory with especial emphasis on the subespecy **israelensis**, toxic for dipteran larvae.
A highly efficient method for the production of **B.thuringiensis** protoplasts was developed. Formation of protoplasts involved the activation of autolytic factors; in order to achieve induction of this system in a rapid and efficient manner, the appropriate conditions for growth and treatment were determined and optimized.
Protoplasts obtained in this way were subjected to transformation with plasmid DNA and to interspecific fusion with a Rec- strain of **B.subtilis.**
Results indicate that these protoplasts can efficiently take up exogenous plasmid DNA as well as act as DNA donors in fusion experiments.
Interspecific fusions were also carried out with protoplasts of **B.sphaericus** strain MR4(2297),highly pathogenic for mosquito larvae..

PATH OGENICITY OF FUNGI AND BIOASSAY DESIGN.Richard A. Hall, Horticultural Research Consultants,70 Parkside Avenue,Littlehampton, West Sussex BN 17 6BJ, England.
The pathogenicity of fungal pathogens of insects depends upon several factors all of which ideally should be quantified in order to appraise fully the potencial of a candidate insecticide. The LC_{50} or LD_{50} gives a measurement of the fungus ability to infect (via the cuticle,trachea or gut) and, through invasive growth, kill the host during a given time-scale. This is the system used practically everywhere. Howewer, such systems can give very misleading results when extrapolated to the field situation; the ability of pathogens to perform well in the field depends on their achieving irreversible infection during what may be a narrow "window" of high humidity and appropriate temperature conditions, the speed, mode and intensity of sporulation on the insect cadaver, and the subsequent ability of those spores to persist in the environment and spread.
In this paper, the fungus **Verticillium lecanii** is used as a model to describe the importance of measuring key parameters while emphasizing the general principles of bioassay from the standpoints of pure research and commercial production(quality control).Other fungal bioassay systems are also mentioned in relation to the **V.lecanii** model.

TAXONOMICAL AND CYTOLOGICAL ASPECTS OF HYPHOMYCETES (DEUTERO-MYCOTINA) ENTOMOPATHOGENIC. Elza Áurea de Luna Alves Lima. Laboratory of Biological Control, CENARGEN/EMBRAPA, C.P. 102372, 70.770 Brasília, Brazil.

The study of fungi taxonomy has increased and had enourmous change in the last 20 years. With the exception of Laboulbeniales, most of entomogenous fungi occur in the subdivision Deuteromycotina, often in the class Hyphomycetes. The morphological variation in this group makes taxonomic, studies complex. The present study was carried out with the purpose to discuss some aspects of the taxonomy and of the conidiogenesis, as well as to show the nuclear behavior during conidiogenesis in Metarhizium, Beauveria e Nomuraea. The numbers and the distribution of nuclei during conidiogenesis were analyzed by light microscopy, with Giemsa-technique on dialysis membranes. The nuclear behavior of the three fungal species was similar.

NEW FACTS AND TRENDS IN BACTERIOLOGICAL CONTROL OF MOSQUITOES. Huguette de Barjac. Bactéries Entomopathogènes, Institut Pasteur, Paris 75015, France.

After the discovery and characterization of Bti (Bacillus thuringiensis israelensis), ten years ago, two lines share the research field in biological control of mosquitoes. One is the quest for new potent bacterial strains from nature. The other one is the genetic manipulation of the already known bacteria. Progress in the first research line is constant. Beside Bti, H14, other Bt isolates (especially among serotypes H8a8b, H10 and H1) have been proved larvicidal for mosquitoes, thus infirming the Bt-Lepidoptera-specificity theory. Moreover, B. sphaericus species has been found to contain several strains very potent against mosquito larvae. The most toxic isolates belong to serotypes H5a5b, 6 and 25. They have a specific spectrum of action, different from the B. thuringiensis action range as well as different indications. Some similarities appear between the mode of action of Bti and B. sphaericus, but their respective toxins are quite different. Recently, a Clostridium sp. strain has been identified as very toxic to mosquito larvae. Comparison of this Clostridium isolate can be made with Bti and mosquitocidal B. sphaericus strains. In spite of a lower toxicity level in usual laboratory conditions, its special physiology could confer on this Clostridium strain some advantages in special natural conditions. Also, knowledge of its toxin(s), genetics and mode of action could permit further genetic manipulation.

WORLD PICTURE OF BIOLOGICAL CONTROL OF INSECTS BY FUNGI.

Donald W. Roberts. Insect Pathology Resource Center, Boyce Thompson Institute, Tower Road, Cornell University, Ithaca, New York 14853

The entomopathogenic fungi fill an important niche in microbial control of insect pests. This is particularly true for pests with sucking mouthparts (e.g. Hemiptera/Homoptera) because these insects have no means of ingesting pathogens, and for Coleoptera since few viral and bacterial diseases of this major group of pests are currently available. Both developing and developed nations are attempting exploitation of fungi for pest control. The largest program at present is the People's Republic of China use of Beauveria to control caterpillars in pine forests and maize. The Brazil effort with Metarhizium vs. spittle bugs in sugar cane and pasture is viewed with great interest worldwide. Large-scale commercial production of Metarhizium in South Australia for control of pasture scarabeid beetles will begin within 3 years. Research projects are underway in Brazil, USA, and elsewhere to develop fungi for control of soil-inhabiting insects. Also, the epizootiology of Zoophthora in leafhopper populations is being investigated. Current research worldwide to improve effectiveness of entomopathogenic fungi includes: fungal molecular biology and genetics, mass production technology (including dried mycelium), formulation, toxic metabolites and epizootiology. With the the use of modern research tools, the role of fungi in pest control is expected to increase significantly.

EVALUATION OF BEAUVERIA BASSIANA PATHOTYPES AS MICROBIAL CONTROL AGENTS OF SOIL-INHABITING CITRUS WEEVILS. Clayton W. McCoy. University of Florida, Citrus Research and Education Center, Lake Alfred, FL 33850 USA.

Strain selection is crucial to the successful use of Beauveria bassiana as a microbial control agent in view of its broad genetic diversity among active strains in natural populations of insects, particularly in relation to virulence, viability, productivity, and host specificity. In quantitative assay of 34 diverse isolates of B. bassiana, only 2 caused greater than 80% mycosis to neonatal larvae of Artipus floridanus at 1×10^5 conidia per ml. At a conidial concentration of 1×10^7 conidia per ml, 12 of 34 types caused greater than 95% mycosis. Sporulation per dead cadaver increased with an increase in pathotype virulence. In general, no consistent differences in pathogenicity could be detected between exotic or indigenous strains. Even isolates from the same host and location differed widely in terms of pathogenicity. Of the 6 most virulent pathotypes, differences in soil survivorship, temperature tolerance, growth and sporulation, and host specificity were detected in laboratory and field tests.

MOLECULAR BIOLOGY OF ANTICARSIA GEMMATALIS BACULOVIRUS. James E. Maruniak & D. W. Johnson. Department of Entomology, University of Florida, Gainesville, Florida 32611 UNITED STATES.

The insect pathogenic baculovirus from Anticarsia gemmatalis (velvetbean caterpillar) is being used as an alternative to chemical pesticides in controlling this pest of soybeans. This application program has been successful so far in Brazil. Scientists in Brazil and the United States together are studying the Anticarsia baculovirus in attempts to improve the virulence to caterpillars and to determine whether the virus preparation has a stable virulence with continuous application in field crop situations. To date we have collected virus preparations from various locations in South America. These are being compared by restriction enzyme analysis to determine relatedness. Several isolates have been plaque purified and analyzed by DNA restriction enzymes. We have constructed a physical map for five restriction enzymes. This has allowed for a DNA comparison of geographic isolates to locate where changes have occurred on the genome. Additionally, the physical map serves as a foundation for genetic engineering of the Anticarsia baculovirus once determinants for virulence and host range are identified. Furthermore, the location and characterization of the gene coding for the polyhedron occlusion protein will allow for the construction of a baculovirus expression vector using the strong polyhedrin promoter to express foreign gene products.

BIOLOGICAL CONTROL OF SUGARCANE BORER Diatraea saccharalis WITH A VIRUS INSETICIDE IN BRAZIL. Octavio Henrique O. Pavan, Helena C. T. Ribeiro. Insect Virology Laboratory. Deptº Genética, I.B. UNICAMP, 13081 Campinas, Brazil.

The Anticarsia gemmatalis Nuclear Polyhedrosis Virus (AgNPV) was selected by a series of 20 serial passages in the sugarcane borer Diatraea saccharalis aiming an increase in virulence to the later species. The original inoculum obtained from the velvetbean caterpillar, A. gemmatalis, while being highly virulent to its original host, has a lethal dose 50 (LD50) close to a million polyhedra for a 11 day old larva. With the serial passages the LD50 value declined gradually reaching a value in the range of hundreds of polyhedra, thus representing an increase in virulence in the order of 2.5 log to the sugarcane borer. This isolate not only increased its virulence to the sugarcane borer but also maintained its original virulence to the velvetbean caterpillar. It is important to notice that A. gemmatalis belongs to the family Noctuidae, D. saccharalis belongs to the family Pyralidae. An analysis of total viral proteins in PAGE showed no detectable differences between the wild and selected isolates. A viral DNA analysis is being conducted in association with Dr. James E. Maruniak.

IMPORTANCE OF EPIZOOTIOLOGY TO BIOLOGICAL CONTROL OF INSECTS WITH VIRUSES. James R. Fuxa. Department of Entomology, Louisiana State University, Baton Rouge, Louisiana 70803, USA.

Epizootiology is fundamental to biological control of insects with viruses for two reasons: microbial control is basically applied epizootiology or, in other words, the manipulation of epizootics; and insect control currently is done in the context of integrated pest management (IPM), which in turn is dependent on ecology, a field closely allied with epizootiology. Different epizootiological factors, including various aspects of the host and pathogen populations and the environment as a whole, will be emphasized in different ways when microbial control is attempted by inundative augmentation of the pathogen or by one of the more ecological approaches (inoculative augmentation, introduction-establishment, or environmental manipulation). For example, control by inundative augmentation will best be accomplished by pathogens that are virulent, kill quickly (e.g., by a toxin), are persistent, and are aimed against r-strategist pests. On the other hand, control by the more ecological approaches will have the best chance for success if the pathogen has efficient transmission and dispersal capabilities, moderate virulence, good persistence, and is aimed against K-strategist or intermediate pests with relatively high economic injury levels. Epizootiology has assumed a renewed importance in the age of genetic engineering. The design of genetically-engineered entomopathogens will depend heavily on epizootiology of the "parental" organisms including resistance of insects to pathogens; and risk assessment of these agents will depend on evaluation of parameters such as persistence, dissemination, population growth, and environmental effects of both the parentals and the genetically-engineered organisms.

MULTIPLE DELTA-ENDOTOXIN GENES IN BACILLUS THURINGIENSIS STRAINS ACTIVE AGAINST LEPIDOPTERAN SPECIES OF THE NOCTUIDAE FAMILY. Marguerite-M. Lecadet, Vincent Sanchis, Ghislaine Menou, Josette Chaufaux & Didier Lereclus. Unité de Biochimie Microbienne, Institut Pasteur, Paris, France.

Several δ-endotoxin genes belonging to different structural types, some of which have not yet been described, have been isolated from B. thuringiensis aizawai 7.29, a strain that is potentially active against the cotton leafworm Spodoptera littoralis. The expression products in Escherichia coli of the cloned genes differ in their nature as well as in the specificity of their larvicidal activity and they have been correlated with components of the insecticidal crystals. In addition to genes belonging to the well known types of crystal protein gene (one of which is of plasmid localization), two other genes of presumed chromosomal origin and located in close proximity (3 kb distant) were characterized. One of them, was shown to direct the synthesis of a protein specifically active against S. littoralis and against several other species of the Noctuidae family. A similar situation was observed in strain entomocidus 601 that is also specific towards S. littoralis. It is concluded that the presence of multiple and different δ-endotoxin genes could contribute to determine the host range specificity in lepidopteran active strains of B. thuringiensis.

UTILIZAÇÃO DE BACTÉRIAS ENTOMOPATOGÊNICAS NO CONTROLE DE DÍPTEROS DE IMPORTÂNCIA MÉDICA: Mohamed E.M. Habib. Deptº de Zoologia, UNICAMP, 13081, Campinas, SP.

A utilização de bactérias entomopatogênicas corresponde à máxima evolução, entre os métodos de controle de dípteros de importância médica. Duas espécies bacterianas demonstraram altamente eficazes para este fim, ambas pertencentes ao gênero Bacillus. A primeira, B. sphaericus, é isolada frequentemente de solos de ambientes aquáticos ou até de larvas de pernilongos. As linhagens 1593 e 2362, por serem produtoras de cristal proteico, são mais patogênicas do que outras linhagens. As características dessa espécie sustentam a sua aplicabilidade para o controle de larvas de Culex e Anopheles.

A segunda espécie, B. thuringiensis var. israelensis, mostrou-se altamente patogênica, embora em níveis variáveis, para larvas de simulídeos e culicídeos. As novas formulações de preparados à base dessa espécie permitem a sua utilização em ambientes aquáticos de tipos diferentes, e, portanto, atingir maior número de espécies dessas duas famílias. O controle dos dípteros aquáticos, sem dúvida, vive hoje numa fase de grande evolução com a descoberta dessas bactérias.

THE GENETIC ENGINEERING OF BACULOVIRUS

FOR FOREIGN GENE EXPRESSION AND AS VIRAL PESTICIDES.

Dr. Max D. Summers, Texas A&M University,
Department of Entomology, College
Station, Texas 77843.

Genetic Engineering of Baculoviruses
1. Baculovirus-directed foreign gene expression.
   a. Characteristics of the BEV and its utilization.
   b. Cost effective synthesis of therapeutics, vaccines and diagnostics in insect cells and insects.
   c. The "authenticity" of recombinant products produced in insect cells.
2. Studies of the molecular biology of insect cells and systems: cloning, expression and study of genes of agricultural importance using the BEV.
3. Transposable elements in baculovirus mutants.
   a. Characteristics of the mutants.
   b. Potential for development as trnsfer vectors into lepidopteran cells and insects.

THE DEVELOPMENT OF BACILLUS THURINGIENSIS AND BACILLUS SPHAERICUS AS BIOCONTROL AGENTS; FROM RESEARCH TO INDUSTRIAL PRODUCTION. **Bertold Fridlender, M.Keren-Zur, S.Brown*, E.Bar*; A.Keynan*, N.Sandler* and R.Hofstein, FRM Agricultural Sciences Partnership, Jerusalem-Israel.** Selection of strains with pest specificity is an important but insufficient element in the development of micro-organisms as biopesticides. The practical application of the these materials requires special attention to be given to aspects related to fermentation and formulation of the active micro-organisms. Efforts have been done in developing cost-efficient fermentation processes for the industrial preparation of **Bacillus thuringiensis israeliensis** (Bti) and **Bacillus sphaericus** (Bs) strain 2362 as biocontrol agent for insects vectors of diseases. Growth medium were selected which relies almost exclusively on industrial by-products. Furthermore, our attention has been directed to the development of specific formulations. It is our approach that "uniquely tailored" formulations will have to be developed for the proper application under different field conditions. Presently such experimental formulations are in the process of development. These were "tailored" as floating formulations to which an element for protection from photo degradation has been incorporated. Results from simulated field trials will be presented. It looks that Bti and Bs can effectively be used for the control of a large number of insect disease vectors each one having its own advantages and disadvantages. We believe that the combination into one bacteria of the properties of the individual ones might result in a better biocontrol agent for comprehensive control of susceptible insects. Some initial genetic manipulations have been done by which a piece of DNA from Bti containing the toxin producing gene has been introduced into Bs. The results so far obtained showed that the resulting recombinant is able to express both Bti and Bs toxin activities. ***The Hebrew University Jerusalem.**

CLASSIFICAÇÃO, IDENTIFICAÇÃO E CARACTERIZAÇÃO DE VÍRUS DE INSETOS*. E.W.KITAJIMA, Dept.Biol.Cel.,Univ.Brasília, 70919 Brasília,DF. *Classification, identification and characterization of insect viruses.*

Os excelentes resultados obtidos no Brasil com o uso do NPV no controle da lagarta da soja *Anticarsia gemmatalis*, ensejou o desenvolvimento de programas similares em bioinseticidas virais em diversas culturas. A fim de dar suporte a essas pesquisas, está sendo organizado em Brasília, no CENARGEN e na Univ.Brasília, um grupo de trabalho para assessorar na identificação e caracterização desses vírus. Tais trabalhos basear-se-ão em estudos morfológicos, citopatológicos, sorológicos e moleculares (em especial dos ácidos nucleicos). Quanto à situação da taxonomia dos vírus de insetos, segundo decisões recentes do ICTV seria: DNA/ISOM/SEM MEMB.-Fam.PARVOVIRIDAE (Gen.*Densovirus*); Fam.IRIDOVIRIDAE (Gen.*Iridovirus, Chloriridovirus*); DNA/HEL/COM MEMB.-Fam.BACULOVIRIDAE (Gen.*Baculovirus*- poliedrose nuclear, granulose e não-ocluidos); Fam. POLYDNAVIRUS (Gen.*Polydnavirus*- fusiforme,bastonete); DNA/COMPLEXO/COM MEMB.-Fam.POXVIRIDAE, grupo Entomopoxvirinae (Gen.*Entomopox*, sugeneros A,B e C); RNA/ISOM/SEM MEMB.-Fam.PICORNAVIRIDAE (Gen.*Enterovirus*);Fam. CALICIVIRIDAE (Gen.*Calicivirus*);Fam.BIRNAVIRIDAE (Gen.*Birnavirus*);Fam. REOVIRIDAE (Gen. Poliedrose citoplasmática); RNA/HEL/COM MEMB.-Fam. RHABDOVIRIDAE (Gen.*Sigmavirus*).

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FUNGOS, SUA UTILIZAÇÃO PARA CONTROLE DE INSETOS DE IMPORTÂNCIA MÉDICA E AGRÍCOLA. Prof.Dr. Claudio Luiz Messias-Depto.Genética e Evolução-IB UNICAMP, Campinas,SP. A utilização de fungos para controle de insetos, está fundamentado na capacidade que estes têm de infectarem seus hospedeiros, lhes causando doença e morte. A doença de insetos causada por micróbios foi pela primeira vez descrita por Agostino Bassi, pai da patologia de insetos, e sua utilização como possível controlador, sugerida por Metschnikoff em 1879. Mais de um século já se passou e a utilização destes em larga escala pouco foi desenvolvida. Sendo um processo racional, não substitutivo dos produtos químicos mas também de reconhecida eficiência, esforços têm sido feito para se utilizar deste controle, que por ser relativamente novo e muitos fatores serem desconhecido, pouco tem sido feito para sua ampla utilização. Vários fatores têm contribuido negativamente neste sentido e um deles pode ser identificado como o pouco investimento do setor privado neste tipo de pesquisa, estando a cargo das universidades e centros de pesquisas que lutam com todo o tipo de falta de recursos. O Brasil é o lider na produção e utilização de fungos para o controle de insetos, assim como: China, Australia e Inglaterra. As condições climáticas reinantes em nosso país propiciam a utilização deste tipo de controle. Resultados obtidos em laboratório e campo tem demonstrado ser o Metarhizium anisopliae um entomopatógeno para o controle de Cigarrinhas de Cana de Açúcar e pastagens, vetores de doenças de Chagas, Mosca de frutas, e mosquitos.

PROBLEMS ASSOCIATED WITH THE PRODUCTION AND USE OF VIRAL PESTICIDES, Seth Y. Young, Department of Entomology, University of Arkansas, Fayetteville, Arkansas 72701.

Several virus insecticides have been developed in recent years. These products differ in their effectiveness but most are less efficaceous than the best conventional insecticides presently on the market and have been little used. Increased use of viral insecticides is dependent on overcoming problems encountered in registration and production, obtaining more effective use in insect pest management systems, and increased acceptance of nonconventional pesticides by crop producers.

Melhoramento genético de fungos utilizados no controle biológico de insetos. João Lúcio de Azevedo. Instituto de Genética, ESALQ, Piracicaba, Universidade de São Paulo, Brasil.

Insetos, pragas da Agricultura, causam danos consideráveis às lavouras, especialmente em países de clima tropical como o Brasil. O controle por inseticidas químicos é, muitas vezes antieconômico, além de apresentar problemas, como emergência de resistência e desequilíbrios biológicos. Uma alternativa para redução ou substituição de produtos químicos é o controle por microrganismos, como os fungos filamentosos. Vários fungos têm sido empregados, como o Metarhizium anisopliae, Beauveria bassiana, Verticullium lecanii entre outros. Maior eficiência pode ser conseguida, se processos genéticos forem utilizados no melhoramento desses fungos. Para isto, é necessário bom conhecimento da Biologia, incluindo reprodução e cruzamento desses fungos. Estudos realizados no Instituto de Genética, ESALQ/USP, mostraram que, tanto M. anisopliae como B. bassiana, apesar de não possuirem ciclo sexual, podem ser melhorados pela utilização do ciclo parassexual. Um novo processo, designado de Parameiose facilita a obtenção de recombinantes e, pelo menos, testes de laboratório têm mostrado sua superioridade, em alguns casos, com linhagens parentais.

USO DE VÍRUS NO BRASIL: O CASO DO VÍRUS DE POLIEDROSE NUCLEAR DA LAGARTA DA SOJA, *Anticarsia gemmatalis*. Flávio Moscardi. EMBRAPA-CNPSo. Caixa Postal, 1.061, 86.001 - Londrina, PR. Brasil.

A utilização de vírus de insetos no Brasil é recente, comparada a de países da América do Norte, Europa e Ásia. No entanto, considerável progresso tem sido obtido com o vírus de poliedrose nuclear da lagarta da soja, *Anticarsia gemmatalis*, o qual foi empregado em mais de 500.000 ha na última safra (1987/88), constituindo-se no maior programa de uso de vírus de insetos a nível mundial. O programa, iniciado em 1979 pelo Centro Nacional de Pesquisa de Soja (CNPSo) da EMBRAPA, contemplou pesquisas relativas à especificidade, epizootiologia, tecnologia de aplicação, métodos de produção e formulação do vírus, que permitiram a implantação de seu uso ao nível de agricultor a partir da safra 1982/83. O programa baseou-se inicialmente na aplicação de suspensões impuras do patógeno, através da maceração e coagem de lagartas mortas, evoluindo para o emprego de uma formulação pó molhável padronizada, já em uso pelo sojicultor há três anos. Estudos referentes à estabilidade genética do vírus, mostram, em dados preliminares, que sua virulência permaneceu praticamente inalterada após vários anos de aplicação a campo. Trabalhos em desenvolvimento no CNPDA-EMBRAPA, Jaguariuna, SP, visam viabilizar a purificação parcial deste agente em escala industrial. No momento, a tecnologia de produção e formulação do vírus desenvolvida no CNPSo-EMBRAPA vem sendo repassada a empresas privadas interessadas na exploração comercial do VPN de *A. gemmatalis*, o que deverá contribuir para um aumento de sua disponibilidade ao sojicultor. Estima-se que a área tratada com este vírus no Brasil poderá atingir 2,0 milhões de hectares em três anos.