KARI
CIMMYT

IRMA Updates
Insect Resistant Maize for Africa

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Contents

The IRMA project was launched in 1999 with the primary goal of increasing maize production and food security for African farmers through the development and deployment of improved maize varieties that provide high resistance to insects, particularly stem borers. To achieve this goal, KARI and CIMMYT scientists will identify conventional and novel sources of stem borer resistance and incorporate them into maize varieties that are well suited to Kenyan growing conditions and to farmer and consumer preferences. Major funding for the project is provided by the Syngenta Foundation for Sustainable Agriculture.

IRMA Annual Meetings 2003

The IRMA project held its Fourth Annual Meeting during 17-20 November 2003. The project team met to compile and report on the year's activities and progress made, and to develop work plans for IRMA II/2004. A meeting with potential partners was held on the meeting's second day, followed by the annual stakeholders meeting at KARI-NARL, which also provided participants the opportunity to visit the biosafety greenhouse complex under construction (see story below). The annual steering committee session was held on the meeting's final day.

Reports from 2003 Activities.

Notable accomplishments for 2003 included:

- Maize OPVs with conventional resistance are available and will be nominated to the Kenya Maize National Performance Trials (NPTs) in 2004.
- The approval to introduce Bt maize seed was received, although the permit for actual importation is pending, requiring approval by KEPHIS, which first requires completion of the biosafety greenhouse.
- Transformation of maize with *cry1Ca* and *cry2a* genes was ongoing.
- The quarantine site has been mapped by GIS for future sampling to monitor the impacts of Bt maize on soil organisms.
- The collection of nontarget arthropods at all five agroecozones was completed. Data analysis and development of databases and reference collections progressed well.
- Surveys for insect resistance management were completed to identify risk areas with insufficient natural refugia. GIS maps were developed. Results indicate that during the long rains there were sufficient refugia in most areas surveyed, except a few such as Bungoma and Vihiga; during the short rains, there was less refugia in some districts.
- Screening maize for resistance to the maize weevil (Sitophilus *zeamais*) continued and screening for resistance to the larger grain borer (*Prostephanus truncatus*) in storage was initiated.

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IRMA Stakeholders Provide Input and View Project Progress

IRMA stakeholders got a report on the past year's work and a glimpse of the exciting developments on tap for the coming year in the form of the new biosafety greenhouse, at the Fourth Annual IRMA Stakeholders Meeting, held 19 November 2003 at KARI-NARL, Nairobi.

Farmers, seed company representatives, university professors, government officials and more were in attendance, which was dampened somewhat by a matatu strike that made transport more difficult, and in some cases, impossible. Nevertheless, those in attendance maintained the active atmosphere seen in past stakeholders meetings and put forward incisive and pertinent questions for the IRMA team.

The meeting was chaired by Dr. Macharia Gethi, Centre Director, KARI-Embu and the opening speech was given by Dr. Romano Kiome, Director of KARI (story, page 4). The meeting was also addressed by Dr. David Hoisington, on behalf of CIMMYT, and Dr. Jost Frei, on behalf of the Syngenta Foundation for Sustainable Agriculture. Dr. Shivaji Pandey, the incoming CIMMYT coordinator for the project was also in attendance.

IRMA co-coordinator Dr. Stephen Mugo, provided a brief overview of the project and highlighted progress and constraints over the past year. He reminded participants of the project's guiding principles set at its initiation in Mombasa in 1999: (1) be a model of good practice, especially for biosafety; (2) serve as a pilot project for public-private partnership and cooperation; (3) employ state of the art technology and methodology; and (4) be transparent and open through ongoing dialogue with various stakeholders.

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(IRMA Annual Meetings cont'd...)

- Gene flow studies showed that the contamination distance using yellow maize in white maize trials were best defined by 1 / d, where d is the distance from the pollen source. Seventy-five percent (75%) of pollen fell within 10m of the central plot of yellow maize.
- Socioeconomic baseline surveys were completed. After interviewing 150 farmers in the Embu region in 2002, 1650 more farmers, in 185 villages, were interviewed during 2003. Survey queries included the varieties used, maize characteristics they prefer, and crop management practices such as fertilizer and pesticide use. Consumer awareness studies were initiated.
- IRMA I received a favorable review and the IRMA II business plan was developed. Potential partners / donors were approached.
- An IRMA corporate video based on the Kiboko seminars was produced and IRMA was highlighted on field trip at CGIAR Annual Meeting. A "Star Search" video was produced, based on extension presentations related to Bt maize. Two IRMA project documents were published and numerous papers developed. IRMA was presented in workshops and seminars and conference presentations / proceedings. An IRMA poster series was produced for CGIAR Annual Meeting and scientific meetings.
- Two visiting scientists, Mrs. C. Taracha and Mr. G. Mwimali from KARI, underwent a six-month, hands-on training in the areas of biosafety, greenhouse operations, and molecular analyses.
- Construction of the level-2 biosafety greenhouse (BGH) complex was initiated at the KARI-NARL Biotechnology Center.

Meeting with potential partners

Potential IRMA II partners were invited to hear presentations on IRMA and IRMA II, and to address the meeting. In their responses, the potential partners made brief presentations on their core business and identified areas where they could participate in IRMA II. The table below indicates the potential partners and their respective representatives.

	Institution	Representative
1	Syngenta Foundation for Sustainable Agriculture (SFSA)	Mr. Jost Frei
2	African Agricultural Technology Foundation (AATF)	Dr. Phelix Majiwa
3	ISAAA	Dr. Margaret Karembu
4	African Biotechnology Stakeholders Forum (ABSF)	Dr. Dorrington Oyoi
5	UNEP-GEF	Dr. Charles Gbedemah
6	KEPHIS	Dr. John Kedera, Director
7	ICIPE	Dr. Hans Herren, Director
8	CIMMYT	Dr. Shivaji Pandey, Director Maize Program
9	KARI	Dr. Joseph Ochieng, ASST Dir
10	Ministry of Agriculture	Mr. J.K. Ng'eno

Apologies were sent by Dr. Joseph DeVries of the Rockefeller Foundation, Dr. Christopher Ngichabe of ASARECA, and Dr. Sengooba of NARO / PBS. Discussions were held on the roles of partners and these will be implemented in the course of time.

IRMA II work plans 2004

Work plans for 2004 deviated from previous year's work plans to better reflect the new work themes put forward in the IRMA II business plan: product development, product delivery, and stewardship. The overall emphasis under the plan is delivering products to farmers. The detailed workplans are including in the IRMA Annual Report 2003.

Steering committee meeting

The roles of new partners in IRMA II and the principles guiding participation of partners in IRMA II dominated the steering committee meeting. Key decisions were reached:

- Launch of the BGH complex will include visits by Members of Parliament and other guests. Activities are projected for an entire morning and will include the opening ceremony, exhibitions, and presentations on biotechnology topics.
- IRMA II will restrict itself using only Bt maize events that are in the public domain and not commercial events. However, use of commercial Bt events can be revisited in the future.
- The steering committee noted that the IRMA I review went well, was useful for providing inputs for direction for phase II, and commended all involved in the project and the review itself.
- Although the Syngenta Foundation does not require a final report, the steering committee members showed interest in producing such a publication. This will be produced before the proposed biosafety greenhouse opening.
- Individual potential partners will be engaged in very specific ways in IRMA II.
- Funding prospects were better than when the IRMA II business plan was prepared. Indications were that Syngenta Foundation would contribute, but significant gaps still remained. The Steering Committee planned to assess and discuss the issue further around March / April 2004.

"The IRMA meetings of 2003, the final ones for this stage of the project, were a success," says IRMA co-corrdinator Stephen Mugo. "Hopefully the ideas exchanged, suggestions made, and decisions reached will provide an impetus for IRMA II, which will be initiated in January 2004."

—S. Mugo, M. Mulaa, and D. Poland

(IRMA Stakeholders Provide cont'd...)

Mugo reported the findings of the IRMA project review, which was undertaken earlier in the year by an independent team. He said the good news was they observed that the achievements of the IRMA project have "been remarkable," and that "a highly motivated team has done excellent work." More critically they noted that the target product, insect resistant maize, had yet to be delivered to farmers' fields, and that the original timeline underestimated the time required to do this. They attributed the delay to the complexity of the social and biotic factors influencing maize development, which needed to be considered alongside the target product, Bt maize. Progress was also slowed by delays in the construction of the biosafety greenhouse.

The review team strongly recommended that a solid business plan be developed for IRMA II along with several other points, the most important of which was to link more closely with farmers and the extension system, and to proactively address critical marketing issues.

Mugo then briefed the meeting on the project's achievements during 2003 (see lead story). In his concluding remarks, Mugo said he believes the IRMA project is on track to attain its goals and that it will serve as an example to other African countries.

Stakeholders were then invited to pose their questions and comments to the IRMA team. A lively discussion ensued and lasted until all had been given time to make their points before the group (see story, page 5).

In closing the formal meeting, Dr. Stanley Wokabi, Director of the KARI Biotechnology Centre, thanked all participants on behalf of KARI for sparing time to attend the meeting and contribute to the IRMA project. In particular, he thanked the farmers for their questions, comments, and evaluation reports, the KARI scientists for work well done, and the chairman for guiding the discussions.

Dr. Ben Odhiambo, co-coordinator of the project then conducted those in attendance on a tour of the facilities, which included offices, labs, an open quarantine area sown to genetically modified sweet potato, and most notably, the biosafety greenhouse, which is well on its way to completion. It was explained to the group that the greenhouse would allow scientists to conduct experiments on the Kenyan stem borers and beneficial insects found in the country's maize cropping systems, without using proxies or simulations of actual plants.

– D . Poland

A Kenyan farmer brings his perspective to the IRMA Annual Stakeholders Meeting.

IRMA co-coordinators Ben Odhiambo and Sthephen Mugo explain the biosafety greenhouse functions to stakeholders.

Head of KARI Addresses IRMA Stakeholders

Dr. Romano Kiome, Director of KARI

The Director of KARI, Dr. Romano Kiome, welcomed all participants to the Fourth Annual IRMA Stakeholders Meeting, observing that this is the latest in a series of such meetings dating back to 2000 and the project launch. He commented that during the first stakeholders meeting, few knew where the IRMA project was going and controversy emerged over the technology being developed by the project. Since then, the project has moved forward, together with the stakeholders, in a cohesive manner and advanced to the point where people are beginning to glimpse the benefits.

Director Kiome emphasized that KARI is happy that Syngenta Foundation has retained its interest and involvement with the IRMA project through their funding, advice, and monitoring of progress. As the Foundation stated at the initiation of the project, there is need to have a consultative process and be as inclusive as possible. This remains a hallmark of the project, which is again reinforced with this meeting.

The IRMA project, said the director, is addressing a serious constraint in maize production using proper state-of-the-art science. It is a "pioneer project" in this region. Genetic engineering is a controversial technology, and so it needs to be handled carefully and particular attention must be given to creating awareness about it. Dialog is needed amongst the media, farmers, politicians, and private sector to assuage doubts about the Bt technology. However, unless we harness science, he said, our future will not be bright, and it is therefore our responsibility to continue spearheading work in this area.

Dr. Kiome continued, saying that KARI now strongly emphasizes biotechnology and its accompanying infrastructure. For example, KARI has built a comprehensive Biotechnology Centre with support from USAID and the Syngenta Foundation. It is important for the IRMA project to be very careful, use good science, strive for perfection and be transparent to ensure good results. He thanked the IRMA coordinators for a job well done and challenged the project to deliver the product soon. He said here in Kenya we keep referring to biotechnology work done elsewhere (e.g., Bt cotton in China and South Africa), but that it is his desire that we soon have our own examples. He hopes that in 3-4 years, IRMA will put its product on-farm and reduce high yield losses due to stem borer damage. To complement this work, KARI has done much to try to enhance the genetic potential of maize varieties, with 20 new varieties about to be released.

The KARI Director assured the IRMA project team of continuing support at institutional and government level. At the political level, he said, there is less patience, and so IRMA might be asked by politicians why it is taking long to take the product to the farmers. Therefore, scientists should move as fast as possible, but cautiously following the biosafety regulations.

The Director said he is aware that the Syngenta Foundation and the Rockefeller Foundation have offered some financial support for the second phase of the project and he hopes others will fill in the gaps. There is a strong possibility of getting good results due to partnerships between IRMA and agricultural organizations, seed companies and farmers. Looking forward, he expressed the desire that the IRMA phase II will start involving neighbors such as Uganda, Tanzania, and Zimbabwe, so they too may benefit from the technology. In conclusion he asked the stakeholders to freely air their views and have them incorporated into the IRMA work plan and activities.

—M. Mulaa

Points Well Taken at IRMA Stakeholders Meeting

(Following are excerpts from the Q&A session of the Stakeholders Meeting)

Q: Mr. F. Ndambuki
(Kenya Seed Co.)

In Dr. Mugo's presentation, he said Makueni district of Kenya did not have enough refugia, what are the implications? Can you elaborate?

A: S. Mugo, D. Bergvinson, M. Mulaa

Makueni represents a large semiarid area that has insufficient suitable refugia species. Area to sorghum plantings and thick stemmed grasses that will support susceptible stem borer populations is inadequate The area may require farmer education on the need to grow structured refugia using non-Bt maize in areas where there is less than 20% refugia from natural stands.

Q: Farmer
(Western Kenya)

I have two questions as follows: (1) Why are some Bt sprays very effective while others are not effective, particularly against *Busseola fusca*? (2) Farmers like recycling maize seed. If they recycle four times, will there be a breakdown of resistance?

A: S. Mugo / J. Songa / D.Hoisington

It is possible the [Bt sprays] were from Prof. James Ochanda's project, which collected the bacterium from soils in that area. That project was screening and identifying Bt strains that are effective against *Busseola fusca*. Prof. Ochanda isolated Bt strains from Kakamega, which were more effective. However, the process of transforming maize using the isolate is time consuming. On point two, if you recycle hybrids there is a possibility of losing insect resistance in the conventional varieties. OPVs can be recycled for three years. Farmers will need to be trained on methods of seed selection that will retain resistance genes to the stem borers.

Q: Mr. Sallem Ismail
(Western Seed Co.)

Dr. Hoisington, can you elaborate more on recycling leading to gene segregation.

A: D. Hoisington

If Bt maize is crossed with non-Bt, the Bt will segregate. The IRMA project wants to make sure that the gene that controls resistance is fixed, so that even when the populations segregate, you still have that gene in all plants.

Q: G. Oduor
(CABI)

The biotechnology process of manipulating genes in plants is treated with suspicion by many people. How much emphasis is being put in phase II to counteract suspicions that may interfere with the uptake of the Bt technology?

A: S. Mugo

Phase II of IRMA has three themes: product development, product delivery, and stewardship. Product delivery deals with regulation, promotion, and seed production and also creating awareness (from policy level to farmers). However, during IRMA I, sensitization workshops were held for various stakeholders and communication materials produced, e.g., leaflets. This work will extend into IRMA II.

A: D. Poland

In the future, the project hopes to build on the basically balanced coverage we've received from the media, when other partners (e.g., ABSF, ISAAA, and AATF) may be brought in to help us get the messages out.

Comment: Margaret Maitha
(National Council of Science and Technology)

As regards public awareness on Bt technology, the NCST is mandated by the government to come up with drafts of bills on regulatory and biosafety policies. There are biosafety laws to be followed. Policymakers were taken for a workshop to be sensitized on biosafety policy.

Comment: Farmer
(Western Kenya)

Currently suspicion about Bt technology should not arise or will be minimal since the product is being developed by qualified Kenyan scientists and they wouldn't do it if it harmed hungry Kenyans. The IRMA project has also involved farmers during the stakeholders meetings and will involve farmers in evaluating the product once it is produced.

Q: F. Ndambuki
(Kenya Seed Company)

From your gene flow studies, you found that 70% of the pollen falls within 10m from the source. It is possible to have pollen move up to 50m depending on the wind direction. The Kenya Seed Company recommends isolation distance of 200m. Do you need further trials on gene flow.

A: S. Mugo

Yes, it is true the isolation distance for certified seed is 200m, while breeders seed is 400m. The gene flow studies were to provide data to tell us how farmers who do not want the Bt pollen in their fields, can keep it out.

Comment: Paul Omondi Okong'o
(Tatro Central Farmers's Group, Yala, Western Kenya).

The efforts shown by scientists and partners (funding bodies) are appreciated by farmers. This project is very different from other projects because farmers had been put on board, they have been involved in the discussions right from the beginning of the project. . . . However, I would like you to know that we farmers are very complicated creatures and cannot accept research or technologies we ourselves have not confirmed through evaluations. . . . It is therefore very important to continue involving farmers in all stages (planning, development and delivery) because it is one way the project can succeed.

IRMA Survey Finds Most Urban Consumers Would Buy GM Foods

A survey conducted under the auspices of the IRMA project during the latter part of 2003 rendered a wealth of information on consumer knowledge and perceptions of genetically modified (GM) crops, notably that most (68%) would purchase GM maize meal, provided the price was the same as for conventional maize meal.

The survey was the work of Master's degree student Simon Kimenju and IRMA economist Hugo de Groote and aimed at elucidating urban consumers awareness, knowledge, attitudes, maize consumption habits, willingness to pay for GM foods and sources of information. A total of 210 respondents at were interviewed at 17 large and small supermarkets; 105 persons aware and 105 unaware of GM crops. The enumerators were advised to keep track of the number of people they did not interview because they belonged to a category whose target had been achieved (either aware or not-aware of GM crops) This permitted a calculation of the awareness proportion in the supermarkets.

Aside from allowing IRMA researchers to gauge public opinion and acceptance of GM foods, the survey data serves as a useful guidepost for future education and communication efforts. "Clearly," says David Poland, who works on IRMA's communication efforts, "if we see a lot of people forming negative opinions based on misinformation as opposed to religious beliefs, for instance, this is something we can address and change through educational efforts. The data gathered on information sources is very useful because it can help us better choose the media to reach our target audience, and develop messages that will advance the debate in a positive manner."

—D. Poland and H. de Groote

Top Officials Introduced to IRMA Project at Annual CGIAR Meeting

High level officials from donor countries and organizations, the Kenyan government, and the centers of the Consultative Group for International Agricultural Research (CGIAR) were introduced to the IRMA project during the annual meeting of the CGIAR, held in Nairobi, 27-31 October.

The KARI-NARL biotechnology facilities were the first stop on a day full of field visits for the VIPs, and the IRMA project was the first presentation on that stop. IRMA co-coordinator Stephen Mugo provided a lively and concise overview of the project and the groundbreaking nature of its research in the application of Bt maize to Kenyan growing conditions. The group, which numbered around 70 visitors, included Hon. Kipruto Arap Kirwa, the Kenya Minister of Agriculture, Mr. Joseph Kinyua, the Permanent Secretary Ministry of Agriculture, Dr. Andrew Bennett, Executive Director of the Syngenta Foundation for Sustainable Agriculture, Dr. Masa Iwanaga,the Director General of CIMMYT, Dr. Ron Cantrell, the Director General of IRRI, and a number of donor representatives.

IRMA Co-coordinator Stephen Mugo presents the IRMA project to a large group of VIPs during the October Annual General Meeting of the CGIAR.

In his presentation, Mugo focused on the potential benefit for farmers of insect resistant maize and the use of conventional breeding and cutting-edge biotechnology to realize those gains. Those in attendance appeared to be favorably impressed by the capacity building aspects of the project as well, which was reinforced by a tour of the biosafety labs and the biosafety greenhouse, conducted by IRMA co-coordinator Ben Odhiambo.

—D. Poland

Kenyan Parliamentarians Attend Biotechnology and Biosafety Framework Workshop

Kenya, like many other developing countries, faces a number of problems in the agricultural sector that might well be addressed through the use of biotechnology. But this potential has not been fully realized in large part for lack of a national biotechnology and biosafety framework.

It is within this context that the African Biotechnology Stakeholders Forum (ABSF) and the National Committee on Science and Technology (NTSC) held a workshop on 31 October–1 November, 2003, in Mombasa, on the broad issues pertaining to biotechnology and the consequent development of a functional legal framework to regulate the applications. The workshop was sponsored by USAID and UNEP-GEF, with additional support from the IRMA project and International Service for the Acquisition of Agri-Biotech Applications (ISAAA). The workshop attracted more than 80 participants, including 68 parliamentarians, representatives from KARI, the ministries of agriculture, education and technology, and health, the Attorney Generals Chambers, and others.

Generally the parliamentarians showed considerable enthusiasm for biotechnology and its potential contributions to the nation's agricultural sector. However, some stated that there was need for ABSF, together with its partners and other stakeholders, to organize a similar forum to thrash out critical issues regarding the enactment of a national biosafety bill. They also indicated that it was procedurally more appropriate that a biotechnology policy be formulated as the issues regarding the bill were being addressed.

A survey on the usefulness of the workshop produced encouraging results. Seventy percent felt that their understanding of biotechnology issues as discussed in the workshop was adequate. The three top issues for which more information was required were effects on biodiversity/environment (25%), molecular marker assisted breeding systems (20.8%), and biosafety (16.6%). A resounding 100% of the parliamentarians responded "YES" when asked if Kenya needed biotechnology. The majority felt that a biotechnology policy and bill should be put in place as early as 2004.

—Excerpted from the ABSF Summary Report on the workshop.

Diagnostic Research Sets Stage for Smallholder Acceptance of Transgenic Crops

Much public debate has revolved around the term "biotechnology," and particularly genetic engineering or modification. In the view of the study's authors, diagnostic research is important in creating an enabling environment for promising biotechnology products in smallholder agriculture, *before* rather than *after* their release. Three questions concern us: (1) Which agricultural biotechnology products can improve the welfare of poor people in sub-Saharan Africa?; (2) What are the constraints to their use by farmers?; and (3) How do these differ from those associated with conventional technologies, and are there particular bottlenecks to farmer adoption that can be addressed.

Biotechnology products with the greatest potential for the region are those that (1) tackle important constraints not easily addressed through conventional plant breeding or pest control methods; (2) pose little risk of endangering trade through exports to countries that do not accept transgenic products; and (3) can improve the welfare of smallholders as sources of food and cash. In East Africa, two prominent examples that meet these criteria are pest and disease resistance in East African highland banana and insect resistant maize.

The theoretic framework of agricultural household predicts that when all markets function perfectly and farmers maximize profits, only prices, agronomic attributes, the technology of the farm, and the agroecology of the region shape variety choices. This is seldom the case, however. When markets do not function perfectly, consumption and production decisions cannot be separated and effective prices are determined within each household based on its characteristics and market access. These factors explain variety choices in addition to the genetic and physical determinants. At the farm level, the authors focused on characteristics that are distinct for transgenic as compared to conventionally-bred varieties, in particular reproduction, traits, background and risk profile.

The study found that although the targeted traits (disease, weevil, and nematode resistance for banana and stem borer resistance for maize) are clearly important to the welfare of smallholder farmers in this region, the expression of the trait is much more visible for maize than for bananas. This has important implications.

Even if farmers can obtain planting material, they will not adopt a variety unless they can directly experience the benefits. Empirical research suggests that farmers are knowledgeable about pests that they can see and touch (weeds, insect, vertebrate pests), but are much less knowledgeable about plant diseases and insect reproduction, which they cannot

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(Diagnostic Research Sets cont'd...)

readily observe. While insect resistant maize will readily display its benefits, adoption of transgenic banana will require publicly-funded educational efforts, unless the resistance traits are stacked with more observable beneficial traits.

Bottlenecks may be encountered in the seed systems that will deliver transgenic varieties of either crop. Commercial maize seed systems are well established in Kenya, but small companies need assistance to transform their own lines, particularly OPVs for resource poor farmers who recycle their seed. Since such companies expect only thin profits from sales of improved OPVs in marginal areas, public funds will be needed to bring varieties with Bt insect resistance to farmers who can reproduce them. A commercial seed industry is unlikely to develop for the East African highland banana. Farmers' systems for exchanging planting material must be better understood before appropriate diffusion strategies can be formulated, and these too are likely to require public funds.

Longer term, the technology may be disadopted by farmers if genetic uniformity leads to more rapid evolution of resistance in the crop disease or pest. The problem can be addressed through plant breeding strategies, promoting the cultivation of multiple varieties with diverse resistance mechanisms, or control through *refugia*, However, in East African smallholder systems, monitoring and inspection systems may not be feasible, making natural refugia the only viable option. Investments to support crop diversification by farmers would be critical for maize. Other options such as seed mixtures may also be considered, though these might exacerbate current seed vending problems. Public investments will be needed to support the generation of farmer knowledge about managing the buildup of insect or disease resistance to the novel varieties.

Finally, as biotechnology products near release, research to understand the context in which smallholder farmers make their variety choices will help pinpoint constraints to adoption. Social science can also provide realistic projections about the likely impacts of transgenic varieties on the welfare of Africa's smallholder farmers in today's changing world.

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— H. De Groote and M. Smale (IFPRI)

Contacts

CIMMYT-Kenya
Drs. Stephen Mugo and
Hugo De Groote
P.O. Box 25171, Nairobi, Kenya
Tel: (254) 2-522878
Fax: (254) 2-522879
Email: s.mugo@cgiar.org;
h.degroote@cgiar.org

KARI
Dr. Ephraim A. Mukisira
Kenya Agricultural Research Institute (KARI)
P.O. Box 57811 Nairobi, Kenya
Tel: 254 2 583149 or 583301-20
Fax: 254 2 583344
Email: eamukisira@kari.org

CIMMYT-Mexico
Dr. David Hoisington
CIMMYT, Apdo. Postal 6-641; 06600
Mexico D.F., Mexico
Tel: (52) 55 5804 7575
Fax: (52) 55 5804 7567
Email: d.hoisington@cgiar.org

Syngenta Foundation for Sustainable Agriculture
WRO–1002.11.51
P.O. Box
CH-4002 Basel, Switzerland
Tel: +41 61 323 56 34
Fax: +41 61 697 71 04
Email: syngenta.foundation@syngenta.com
http:// www.syngentafoundation.com

Do you have a question or comment about the IRMA project or the quarterly newsletter articles? Or perhaps you have an article you would like to contribute. If so, please contact the IRMA Quarterly Newsletter editor at d.poland@cgiar.org or IRMA Coordinator Stephen Mugo (s.mugo@cgiar.org).