四川省农业科学院—国际玉米小麦改良中心
科技合作回顾与展望
SAAS—CIMMYT Cooperation
Review and Prospects
1966—2007
SAAS—CIMMYT Cooperation

Review and Prospects

1966—2007
Sichuan Academy of Agricultural Sciences (SAAS) was founded in 1938, the earliest agricultural institution in Sichuan or even in West China. Through over 60 years unremitting endeavor, it has become one of the leading comprehensive agricultural research institutions and research base in China, which involves in more than 50 subjects, including main grain crops, cash crops, rotation system, resources and environmental protection, biotechnology and information technology. At present, there are 13 institutions, 12 national key laboratories or subcenters, and a post-doctorate research workstation appointed by Ministry of National Personnel at SAAS. SAAS have 1480 staffs. Among them, 560 staffs are researchers, 163 staffs are of Ph.D. and Ms., 74 professors and 176 associated professors. 2 are listed as the National Top Hundred, Thousand and Ten thousand Talents, 78 enjoy the allowances of the State Expert with Outstanding Contribution and the State of Council. 36 won the titles of the Academic and Technological Leading Scientist and/or the Expert with Outstanding Contribution of Sichuan Province. 2 won the Sichuan Excellent Contribution Awards at municipal and provincial levels.

During the “10th five-year plan”, the number of the national projects led by and the national achievements obtained by SAAS, and the coverage rates of new varieties released and new technologies created, ranked the first at the provincial academies. SAAS established relationship and cooperation with as many as 34 countries, such as Australia, Italy, Netherlands, Japan, American and Canada, and 12 international organizations, such as CIMMYT, CIP and IRRI with over 180 cooperative projects.

After entering into the new millenary, SAAS drives into the fast lane of the new century. “The best academy in West China and the first class academy in China” was put forwarded by SAAS and become the goal to strive for.

Our group spirit: Dedication, innovation, practice and cooperation.

Rooted in Sichuan, based on China, and overlooked wildly to the world, through self-innovation, researchers at SAAS are determined to make new contributions to the agricultural development and income-added for farmers. Through international cooperation, researchers at SAAS are determined to make new contributions to elimination of the poverty and maintenance of the food security in developing countries of the world.
国际玉米小麦改良中心（CIMMYT）简介
Centro Internacional de Mejoramiento de Maiz y Trigo

国际玉米小麦改良中心（Centro Internacional de Mejoramiento de Maiz y Trigo, CIMMYT）是国际农业研究协约小组（CGIAR）下属的16个国际农业研究中心之一，是一个非营利性的国际农业研究和培训机构。中心成立于1966年，总部设在墨西哥的埃尔巴丹。其主要任务是：在保护自然资源的基础上，通过提高玉米、小麦的种植利润率，生产能力和持续性，来消除贫困，保障发展中国家的粮食安全。主要业务活动包括：培育抗病（虫）抗逆玉米、小麦新品种；搜集利用世界各地的玉米、小麦遗传资源；研究玉米、小麦生产体系持续发展的新方法；开展自然资源保护、经济、生物技术、作物生理和生态系统管理战略性研究；寻求更为有效的科研新方法；提供新的科研信息；提供中高级专业培训，为合作伙伴提供技术咨询等。

主要业务部门：玉米项目、小麦项目、经济项目、自然资源项目、应用生物技术中心和对外关系部。中心现有高级科学家及管理人员100多人，来自40多个国家和地区。CIMMYT共有17个驻外机构，最高决策机构是理事会（由14个国家的18位科学家组成），理事会每2年一次年会，负责审查中心的科研项目、经费预算、任免中心领导成员和聘请高级研究人员等。Masa Iwanaga是CIMMYT总主任，何中国博士为CIMMYT驻中国办事处主任（北京）。

中国办事处国际合作及对华交流情况：CIMMYT的研究成果对发展中国家的农业生产产生了巨大影响。发展中国家有超过5万千公顷的土地种植了带有CIMMYT亲本的小麦品种。占发展中国家小麦种植面积的25%。CIMMYT亲本的小麦品种。几乎所有70年代绿色革命时期培育出来的小麦品种都得到了更新，取而代之的是产量更高、杀虫剂用量更少的优良品种。发展中国家有超过12000万吨的玉米种植面积采用了带有CIMMYT亲本的玉米品种，其中50%的面积种植的是玉米改良品种。CIMMYT培育的玉米、小麦品种每年使发展中国家在粮食生产上增收几十亿美元，有5000多名世界各地的科研人员得到过CIMMYT提供的培训。CIMMYT的产品信息及其网络大大提高了发展中国家的科研效率。

CIMMYT is committed to improving livelihoods in developing countries. Through strong science and effective partnerships, we create, share, and use knowledge and technology to increase food security, improve the productivity and profitability of farming systems, and sustain natural resources.

CIMMYT is a non-profit research and training center with direct links to about 100 developing countries through offices in Asia, Africa, and Latin America. We participate in an extensive global network of people and organizations who share similar development goals, including the public and private sector, non-governmental and civil society organizations, relief and health agencies, farmers, and the development assistance community.

CIMMYT grew out of a pilot program in Mexico in 1943, sponsored by the Government of Mexico and the Rockefeller Foundation. The world had seen what expertise in plant breeding had accomplished for the USA in the wake of widespread crop failure, hunger, and poverty during the Great Depression. Could similar expertise benefit Mexico and other nations?

The project developed into an innovative, sustained collaboration with Mexican and international researchers. It established international networks to test experimental varieties. One of its researchers, Norman Borlaug, developed shorter wheat varieties that put more energy into grain production and responded better to fertilizer than older varieties. By the late 1950s, Mexico was self-sufficient in wheat production. Mexico’s success inspired project researchers to become fierce and effective advocates for the Mexican innovation model in other countries. In 1966, having survived one poor harvest but facing another, India took the extraordinary step of importing 18,000 tons of wheat seed from Mexico. The first evidence of success was the Indian wheat harvest of 16.5 million tons in 1968, compared with 11.3 million tons in 1967. Pakistan also began importing Mexican wheat. These two countries doubled wheat production between 1966 and 1971. The Green Revolution which had by now extended to rice had begun.

The social and economic achievements of the Green Revolution were recognized worldwide when the Nobel Peace Prize was awarded to Norman Borlaug in 1970. The following year, a small cadre of development organizations, national sponsors, and private foundations organized the Consultative Group on International Agricultural Research (CGIAR) to spread the impact of research to more crops and nations. CIMMYT was one of the first international research centers to be supported through the CGIAR.
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序言

从上世纪80年代初开始，四川省农业科学院（SAAS）和国际玉米小麦改良中心（CIMMYT）开展了国际农业科技合作，到现在已有20多年的历史。

在CIMMYT于成都召开2007年理事会之际，SAAS整理出版了回顾双方合作历程的画册。这是一件很有意义的事，它不仅能使我们想起那些为合作成功做出重要贡献的人和那些有重要影响的事，更能使我们认真总结合作的经验，努力思考深化合作的方向和措施。为此，我很乐意为该画册作序。

SAAS和CIMMYT通过科研信息交流、育种资源共享、人员互访和培训，显著提高了各自的研究水平，并培育出很多优良的玉米和小麦品种，为四川和中国乃至世界的农业科技和农业生产做出了很大贡献。四川农科院引进CIMMYT的育种资源和先进的育种技术，成功培育出了四川以前没有的强筋小麦品种川麦36和川麦39，培育出了迄今四川省产量最高的小麦品种川麦42，培育出了四川第一个优质蛋白玉米品种成单101和抗旱高产玉米品种成单18等。这些品种在生产上推广应用后，不仅显著提高了全省粮食产量，也显著改善了全省的粮食品质。

四川的小麦资源也为CIMMYT的育种做出了重要贡献。SAAS的小麦品种引入CIMMYT后，培育出了很多优良品种。这些品种继承了四川小麦高产和抗病的优点，特别是抗粒腥黑穗病的优点。例如，CIMMYT用川麦18培育出小麦品种CIMBRD，在墨西哥推广后，有效控制了世界性检疫病害粒腥黑穗病在当地的流行。

与CIMMYT的合作还为四川培养了一批优秀人才。CIMMYT的30多位高级专家访问了四川，其中包括诺贝尔奖获得者、绿色革命之父、CIMMYT创始人诺尔曼布劳格博士和获得我国国家“友谊奖”、“金顶奖”的小麦专家拉格拉姆博士。SAAS也派出了20多位科技人员到CIMMYT访问、学习或开展合作研究，回国后他们中有2人担任了院级领导，2人成为院属作物所的领导，6人成为四川省学术技术带头人，他们培育的品种和研制出的栽培技术已在全省和全国广泛推广，并获得了国家和四川省的奖励，有些成果甚至引起了世界的关注。

互利共赢，相互学习，是SAAS和CIMMYT长期成功合作的基础。希望双方进一步完善合作机制，不断把合作推向新的高度，为保证四川粮食安全和解决世界上发展中国家的饥饿与贫困问题做出更大的贡献。

2007年3月28日

四川省人民政府副省长

印永庚
Preface

It is over 20 years of history since early 1980s, that we have the international cooperation on agricultural research between Sichuan Academy of Agricultural Sciences (SAAS) and International Maize and Wheat Improvement Center (CIMMYT).

At this moment of the CIMMYT Board meeting 2007 held in Chengdu, SAAS has collected a series of photographs to show the mutual cooperation. It is a significant matter since it would not only remind us those who contributed greatly to our successful cooperation and the influential events, but also learn seriously from the experiences of the cooperation, so that we can consider how to further cooperate deeply and widely in the years to come. Therefore, I am very happy and feel honorable to write this preface.

Through research information communication, germplasm exchange, shuttle breeding program, and personnel visits/training, SAAS and CIMMYT have significantly enhanced their research levels respectively. A number of elite wheat and maize varieties have been bred and released, contributing greatly to Sichuan and even the world in agricultural sciences and technology as well as agricultural production. SAAS has introduced from CIMMYT the breeding materials and advanced breeding techniques, and successfully bred the breakthrough wheat varieties Chuanmai 36 and Chuanmai 39 with strong gluten, Chuanmai 42 that has the highest yield in the history of Sichuan provincial yield trial, quality protein maize (QPM) variety Chengdan 201, the first QPM of the sort in the province, and Chengdan 18 that has tolerance to drought, etc. These varieties have been widely used in production and increased grain yield of the entire province as well as improved the variety quality.

The wheat germplasm of Sichuan has also contributed to the breeding program of CIMMYT. Since the introduction of Sichuan germplasm into CIMMYT, several varieties have been released, which have merits of high yield and resistance to diseases particularly karnal bunt, the heritage of Sichuan wheat. An example is the wheat variety CBRD bred by CIMMYT with pedigree of Chuanmai 18, effectively controlled the international quarantine karnal bunt outbreak when CBRD was extended in Mexico.

A number of excellent researchers in Sichuan have been trained owing to the cooperation with CIMMYT. Over 30 senior scientists from CIMMYT have visited Sichuan, among whom Nobel winner, father of green revolution and CIMMYT founder Dr. N. E. Borlaug won the “Friendship Award” by the State Council of China, and Dr. Rajaram won “Golden Summit Prize” by Sichuan government. SAAS has sent over 20 scientists to CIMMYT visiting, learning and cooperating there. After coming back, two of them have been promoted to the position of leadership of SAAS, another two the position of leadership of the institutes under SAAS, and 6 scientists have won the honor of the leading scientists on academic by the provincial government. Plenty of new varieties and cultivation techniques bred or developed by them have been widely extended in Sichuan and across the country. Because of these achievements, they obtained awards by the national and provincial governments, some of which have given rise to the world interest.

Mutual benefiting and learning are supposed to be the basis of long-term successful cooperation between SAAS and CIMMYT. I wish both sides would further improve cooperation mechanism and continue cooperating at a new level, so that we can contribute more to the food security of Sichuan and to elimination of starvation and poverty in developing countries.

Mr. Guo Yongxiang
Vice Governor of Sichuan Government
March 28, 2007
四川农业产业概况及面临的问题

四川属农业大省，地处中国西南内陆，地域辽阔，人口众多，资源丰富，地理环境优越，自然条件较好，农作物种类繁多，主要农产品在全国占有重要地位，素有“天府之国”美称。

幅员辽阔，地形地貌复杂，全省幅员面积48.5万平方公里，占全国的5.1%，全省总人口780万人（常住人口），占全国人口的6.6%，列第三位，全省总人口的23.1%，居第一位。其中农业人口6734.2万人，农村劳动力9353.3万人，其中从事农业的劳动力2414万人。

2003年年末全省总人口8700万人（常住人口），占全国人口的6.6%，列第三位，占全省总人口的23.1%，居第一位。其中农业人口6734.2万人，农村劳动力9353.3万人，其中从事农业的劳动力2414万人。常年向省外劳务输出400多万人。

耕地少，中低产田比重大。四川现有耕地5855.5万亩，占全国耕地总面积的4.2%，列第二位。占西部耕地的14.4%，列第一位，其中水田3132.4万亩，旱地2723.1万亩。全省人均耕地0.69亩。中低产田占耕地总面积的40%左右。

农业生产气候条件较好。东部四川盆地，属亚热带湿润气候，四季分明，气候温和，少雨。年均气温16℃以上，无霜期240-300天；年降水量1000-1400毫米，年日照1000-1600小时，为全国最低值区。川西南山地，活跃夏凉，四季分明，但气候季节变化大，年均温12-20℃，无霜期220-330天；年降水量900-1200毫米；年日照2200-2700小时。特别是攀枝花一带，被称为长江上游的“金三角”，“聚宝盆”。年降水量14-20℃，可满足一年三熟，与南亚热带接近。河谷地带有寒夏无冬，温凉气候条件，是全国的芒果、石榴和葡萄生产品位地区。西部高山峡谷高原，冬寒夏凉，水热不足，但日照充足，气候垂直变化显著，年均温4-12℃，无霜期100-200天；年降水量900-200毫米；年日照2200-2700小时，超出盆地约一倍以上。

种植业以粮食生产为主，经济作物种类繁多。2003年全省农作物总播种面积13627.4万亩，其中粮食作物面积9131.7万亩，占67.0%；经济作物面积2061.1万亩，占15.1%；其它作物面积2434.1万亩，占17.9%。盆地中部以水稻种植为主，其它作物以蔬菜、水果、茶叶、烟叶、麻类、药物等。

主要农副产品在全国占有重要地位。2003年，四川农业总产值1784.5亿元（当年价），占全国的8.0%，占西部12省、市、区的25.1%，居全国第六位。四川是我国最大的粮食和副食品产地，农作物中粮、油、棉、肉、花生、桑、茶、果、药、烟具有相当的优势。

主要玉米产量占全国的7.4%，占西部的20%。四川是全国第三大省粮食产量占全国的20%，占西部的30%，占全国第四大省蔬菜面积占全国的20%，占西部的40%，占全国第五大省。农产品加工品，如食品、化妆品等农产品加工品，占全国的80%。

四川经济建设成就巨大，不仅以占全国4.2%的耕地，养活占全国6%的人口，常年调出稻谷130万吨。同时，我省省交栽培科研所科技优势明显，杂交水稻制种面积占全国第一位，每年调出杂交水稻种子5万吨，占全国消耗总量的60%。调出食用植物油油10-15万吨，蔬菜120万吨，水果30万吨，猪肉180万吨，酒类30-40万吨，以及烟草、中药材等农产品加工品，支撑其他省市的经济建设。

四川农业产业面临许多问题。一是人口持续增长和工业发展对粮食的强力需求，粮食安全压力大。二是化肥、农药的长期使用和工业污染，使农业生态环境恶化，极大地影响到耕地的可持续发展和食品安全，生态环境压力大。三是长期以来致力于提高单产而放松品质改良，生产方式落后，农产品质量低，使产品质量和劳动成本高，市场竞争力特别是国际市场竞争力弱。四是治理环境复杂，自然灾害频繁，特别是水资源匮乏日益突出，将严重影响农业生产。五是农业基础设施建设投入不足，加上小户经营，经济条件差，投入少，基本是靠天吃饭。
Agricultural production in Sichuan province and the challenges

Sichuan is the big agricultural province that situates in inland of Southwest of China, characterized by its vast territory, large population, rich resources, favorable natural conditions and plenty of cropping products. The main agricultural products take up the important portion of the national one, hence honorably named “Country of heaven” in the history across China.

There is vast territory of the province with complex topology. The total area is 485000 square kilometers taking up 5.1% of the whole country, ranking the fifth largest. The east is the basin area and the southwest is mountain area whereas the west is highland. The plain area takes up 7.87% and hilly area 10.06%, while plateau takes up 32.08%, the mountain 49.44% and the water 0.58%.

The province is densely populated hence with rich labor resources. At present, it has 21 cities or prefectures, 181 counties or the equivalent units and 5008 towns. The population reached 87 millions in 2003, taking up 6.6% of the entire country, ranking the third in the country and taking up 23.1% in the West ranking the first. The rural area has the population 67.342 millions with labors of 39.353 millions among whom 24.14 millions engaging in cropping, forestry, husbandry and aquaculture. The province normally exports over 4 million labors to outside the province.

There is small arable land per capita, i.e. only 0.046 ha in which intermediate and low yielding land occupy the main portion of the total arable land, i.e. around 40%. The area of arable land is 3.90 million ha, taking up 4.2% of the entire country's arable land, ranking the second while 14.4% of the West ranking the first, among which 2.09 million ha for paddy field and 1.81 million ha for dry land.

The climate conditions are favorable for agriculture. In the east basin area, it belongs to sub-tropical wet climate, with high temperature average over 16°C, long non-frost period 240-300 days a year, abundant precipitation 1000-1400 mm, but less sunshine of 1000-1600 hours a year being the lowest across the country. In the southwest mountain area, the weather is characterized by warm winter and cool summer without much difference across the year. But there are distinguished dry and wet seasons with many changes vertically. The average temperature is 12-22°C, non-frost period 220-330 days a year, annual precipitation 900-1200 mm, and sunshine 2200-2700 hours a year. In some valley areas the cropping pattern is three crops a year similar to the southern sub-tropics, where the crops include grain, sugar beet and various fruits, while in some other plateau areas, cold winter prevails with little precipitation but abundant solar radiation reaching 1600-2600 hours, doubling the value of the basin areas.

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The main crops are of food types, with various cash crops. There is high planting index inland with fine cultivation. The main cropping types are summer harvest crops, autumn harvest crops and late autumn harvest crops, i.e. three crops a year with cropping index 232.7%. The main crops are rice, wheat, maize, potato and sweet potato. Other crops are cotton, oil seeds, sugar beat, fruits, tea, tobacco, hemp and flax, Chinese medicines, etc.

The main agricultural and bi-products in the province takes up important portion of the country with 178,450 million RMB in 2003, taking up 6.0% of the country and 25.1% of the West. The province has become the most important province for agricultural products in the West, even the husbandry sector takes up 9.2% of the country ranking the second. The hybrid rice research and utilization are leading in the country, even exporting large quantity of the hybrid seed as well as other important products such as edible oil, vegetables, fruits, pork, liquors, silk, Chinese medicine, and processed products.

The problems and challenges that the province faces are equally plenty. First of all, the food security is pressing with constantly increased population and demand of food by industry. Secondly, the long term over manufacturing of chemical fertilizer and pesticide results in worse industrial pollution to the agricultural production environment, damaging the sustainable farming and food safety. Thirdly, there is lagged behind production ways, i.e. the low quality and yield of the products with small scale production resulting in increased labor cost and low competition especially the international one. Fourth, there are frequent natural disasters occurring each year due to complex geography and topology, especially lack of irrigation water that severely reduced the production. The fifth, there is lack or poor infrastructure in the rural areas for agricultural production, with small farmer and low input, so that the production mainly relies on weather conditions.
丘陵旱地麦玉间套复种
Intercropping of wheat and maize in hilly area

条锈病是小麦最大威胁
Stripe rust is the first disease of wheat in Sichuan

干旱威胁
Drought is one of the constraints to maize production

四川小麦主要消费形式
Hand-making wheat products
川麦42长势旺盛
Strong vigor growth of Chuanmai42 derived from synthetics

免耕抛秧栽培
Broad casting rice seedlings under zero tillage

免耕移栽水稻
Transplanting rice seedlings under zero tillage after wheat
SAAS-CIMMYT科技合作回顾
Review of the Cooperation between SAAS and CIMMYT

四川省农业科学院（SAAS）与国际玉米小麦改良中心（CIMMYT）已有20多年合作历史，通过双方间的科技交流、资源共享、人才培养等工作，在作物育种和栽培领域都取得了显著成效。特别小麦和玉米育种方面，通过引进CIMMYT的种质资源和育种技术，成功地培育出了以川麦30、川麦42、成单202等为代表的系列高产、抗病、优质小麦和玉米新品种，并在生产上大面积推广应用。CIMMYT利用SAAS的种质也培育出了很多高产、抗病品种，特别是抗粒腥黑穗病的品种。双方的合作不仅拓宽了四川小麦种质资源的基因库，促进了四川小麦和玉米育种水平和生产水平的提高，还为四川培养了一批优秀的科研和管理人才，推动了四川国际合作迈上新台阶，扩大了四川育种特别是小麦育种研究的国际影响力。

The cooperation between SAAS (Sichuan Academy of Agricultural Sciences) and CIMMYT (International Maize and Wheat Improvement Center) began from mid of 1980s focusing on germplasm exchange, shuttle breeding, personnel visiting and training. By utilizing the germplasm, and new breeding methods introduced from CIMMYT, a series of wheat, barley and maize varieties with high yield, good quality and disease resistance were released by SAAS, such as wheat varieties Chuanmai 30, Chuanmai 42, barley variety Wei24, maize variety Chengdan 202, and so on. CIMMYT also produced many wheat varieties with good yield, good resistance especially to Karnal bunt disease based on the germplasm from SAAS. SAAS-CIMMYT cooperation not only has enriched the gene bank of germplasm in Sichuan, promoted the wheat breeding capability and application level in production, but also trained many scientists for SAAS, which in return to promote the cooperation to a high level.

The welcome ceremony held by SAAS for Dr. Norman Borlaug
从左至右：
刘旭 中国农科院副院长
张爱民 中国科学院遗传与发育研究所副所长
何中虎 CYIMMYT驻中国办事处主任
S. Rajaram博士
辛志勇 前中国农业科学院作物所前所长
李跃建 四川省农科院院长
肖志敏 黑龙江省农科院副院长

李跃建院长在北京参加CIMMYT中国办事处成立揭牌仪式
Dr. Li Yuejian on the opening ceremony of China Office of CIMMYT in Beijing

中国农科院、CIMMYT和澳大利亚ACIAR在四川省农科院召开全国小麦条锈病研讨会
Stripe rust workshop at SAAS in 2002

四川省农科院党委书记、副院长黄国平博士与前来参加CIMMYT亚太区域研讨会的Larry Harrington博士亲切交谈
Dr. Larry Harrington, Mr. Wang Shubin and Dr. Huang Gang, at the IAP of CIMMYT

布劳格博士与四川省农科院的领导和专家在田间
Dr. Norman Boriauag with wheat breeders of SAAS in wheat field

CGIAR主席Ian Johnson和CGIAR秘书长Francisco Reifschneider博士访问四川省农科院温江试验站
Ian Johnson and Dr. Francisco Reifschneider (the chairman and secretary of CGIAR, respectively) visited the Wenjiang Experimental Station of SAAS
小麦穿梭育种

Wheat Shuttle Breeding

小麦在四川是仅次于水稻的第二大作物，也是冬季种植作物中面积最大、最高产的作物，而且还是所有粮食作物中商品率最高的作物。小麦生产的稳定发展，对四川保证粮食供给、农民增收和畜牧业、食品加工业的发展以及多熟制改革和农业结构调整都至关重要，历来都受到各级政府和广大农民高度重视。在小麦育种和栽培专家的共同努力下，70年代中后期，在引进以意大利品种为参考与四川地方品种及早期育成品种相结合的基础上，四川育成、推广了以6和绵阳11为代表的新一代高产、抗条锈品种，将四川小麦育种及大面积生产推向了一个新的高度。但是，受生态和生产条件的限制，以及四川条锈病新生理小种变化频繁的威胁，四川小麦育种如何寻找新的突破口，是四川省小麦育种家面临的重大挑战。

以前CIMMYT育成的矮秆、高产和广适应性小麦品种为特点在70年代引导的全球绿色革命，让四川小麦育种家们看到了新的希望和方向。从1966年第一份CIMMYT育成小麦品种Penjamo 62引入四川，到80年代中期，先后有20多份CIMMYT育成的绿色革命中发挥重要作用的小麦品种被引入四川观察种植。但是，这些品种在高产潜力和生产、生态适应性上都不及四川自育的新品种6和绵阳11，因而没有一份能在生产上推广种植。

1988年底，中国和CIMMYT签订小麦穿梭育种合作协议，四川省农业科学院（SAAS）被指定为我国3个冬麦穿梭点之一。从此，四川开始了系统地利用CIMMYT品种和育种新技术的育种新方向。在这一漫长过程中，我们深刻体会到，CIMMYT真正对四川小麦育种最具影响力的是三个方面：引进有用种质；提供育种新技术和新思路；科学家交流及对青年专家的培训。我们首先加大了CIMMYT品种在四川生态下的筛选力度；以我院原有小麦育种项目及积累的育种材料为基础，有针对性地选择了冬春杂交、穿梭育种、改良混合选择和微效多基因持久抗性等CIMMYT育种新技术及新思路结合较为成熟的DH群体及重组自交系群体等分子技术，构建了自己新的育种体系。由于生态条件的巨大差异，坚持引进改良、自身创新为主，CIMMYT四川/四川及冬/春已证明是利用CIMMYT品种资源较好的杂交模式。以熟悉四川育种及CIMMYT育种的专家和在CIMMYT接受过培训的青年专家为核心，组成目标明确、分工合作的育种及科研团队，并坚持不懈地成功地利用CIMMYT品种及技术的基础；加大双方科学家互访及对青年科学家的培训力度和信息资料的及时交流，增进双方科学家对方育种理念、生态环境、育种资源、技术经验以及育种材料的田间长相等的深刻认识和体会，从而增强双方工作的针对性与互动性，是有效利用CIMMYT品种及技术经验的成功保证。截至2006年，选用CIMMYT品种由四川育种家育成的小麦新品种已达19个（其中四川省农科院育成12个，包括4个通过国家品种审定，4个世界上首次利用CIMMYT人工合成种育成的商用普通小麦新品种），大麦新品种3个（全由四川省农科院育成）。这批新品种在四川突出表现出以下方面的优势：为四川输入了一批条锈病抗源；使四川首次在抗条小黑麦育种上获得突破；打破了四川小麦育种单产水平长期徘徊的局面，促使了四川小麦高产育种新水平。预期在近几年内，将有更多利用CIMMYT品种育成的小麦新品种在四川和国家审定推广。这表明，CIMMYT小麦种质及育种新技术已成为四川小麦品种改良与创新中不可或缺的重要因素。

我们坚信，通过双方更加紧密和更进一步深入的合作，一定能推动四川的小麦育种事业更快地融入国际发展新潮流，从而能为四川农业生产的持续发展和建设和谐的社会主义新农村作出应有的贡献。
Brief of the Cooperation of Wheat Shuttle Breeding Program between SAAS and CIMMYT

Wheat is the second crop after rice in Sichuan, but wheat has the biggest growing area and has the highest yielding potential among the winter crops in Sichuan, wheat has also the highest sell ratio among all food crops in Sichuan. The continuous and stable development of wheat production in Sichuan is particularly important for ensuring the food supply, increasing farmers income and for the rapid development of animal husbandry and food processing industry. Wheat is also the key crop in multi cropping system development. Therefore the provincial government and the farmer in Sichuan have to pay more attention to the development of wheat production. With the hard working of wheat breeders and agronomists, wheat production in Sichuan has been developing very fast, in particularly in middle 70s the released of high yielding and good stripe rust resistant new wheat varieties Fan 6 and Mianyang 11, based on the introduced Italian wheat varieties crossing with Sichuan local landraces or breeding varieties/lines, had pushed the wheat breeding and wheat production onto a new plateau. But being the restriction of agro ecological environments and the lower production ability, wheat yield in Sichuan is still lower than national average and the potential of severe epidemic of stripe rust is still there because the fast changes of new races. How to find the new broken through on wheat breeding is a big challenge facing to all wheat breeders in Sichuan.

The high yielding and wide adapted wheat varieties released from CIMMYT in the green revolution in 70s gave new hopes to the Sichuan wheat breeders. Started from the first CIMMYT wheat variety Penjamo 62, about 20 more CIMMYT released wheat varieties were introduced into Sichuan during 1967-1983 with the hopes that maybe some high yielding varieties could be used directly onto the commercial production in Sichuan. But after several years of planted and screened under Sichuan environments, we found that no any CIMMYT introduced varieties could compete with the new released varieties Fan 6 and Mianyang 11 on yielding potential and adaptation under Sichuan agro-ecologic conditions.

In 1989, the agreement of China-CIMMYT wheat shuttle breeding collaborative project was signed in Beijing and Sichuan was designated one of the three spring wheat shuttle sites in China. Since then, wheat breeders in Sichuan started to use CIMMYT germplasm and breeding technologies regularly for improving wheat breeding in Sichuan. In this long period of cooperation with CIMMYT, we realized that the very important and helpful things we got from CIMMYT in our wheat improvement in Sichuan were basically three areas: the exchange of useful breeding germplasm; the offering of new breeding strategies and technologies; and the exchange of scientists, especially the training course for young breeders from Sichuan. Our basic experience could be listed as followings:

a. screen introduced CIMMYT germplasm under Sichuan ecologic environments intensively;

b. based on the breeding programs in our academy and breeding materials and breeding systems they have, several CIMMYT basic, new and advanced breeding technologies and strategies were chosen, such as winter/spring, shuttle breeding, modified-bulked selection, and multi-minor genes durable resistance of yellow rust, to improve and form a more effective breeding system in Sichuan with the DH population method and RILs we learned from the China-ACIAR Sichuan wheat improvement project;

c. because the big difference of ecologic environments and the genetic background of germplasm between CIMMYT and Sichuan, we emphasize that introducing is just for improving and creating our own new breeding system, for example, we introduced winter/spring method from CIMMYT but now we modified it into winter/spring//spring, or CIMMYT/Sichuan//Sichuan and these were indicated very helpful breeding pattern in using CIMMYT germplasm in Sichuan;

d. formed a scientific research team based on the wheat breeders who know both CIMMYT wheat breeding and Sichuan wheat breeding very well, especially the young trainees backed from CIMMYT training course, this is a very important work base for continuing, consistent and successful cooperation with CIMMYT;

And e. strengthen the exchange of scientists and training the young wheat breeders in CIMMYT to enhance the understanding of scientists between CIMMYT and Sichuan in their breeding philosophy, breeding strategies, ecologic environments, their breeding materials and the growth of breeding materials in field, and in this way the scientists of both side can help each other and therefore making the cooperation more effective and smoothly.

By year 2006, 19 CIMMYT germplasm derived wheat varieties and 3 barley varieties were released in Sichuan, among them 4 were also released by national level and one was the first commercial common bread wheat variety in the world derived from a CIMMYT synthetic breeding line Syn-CD788 ( Altar84/Aegilops tauschii188 ). These new released CIMMYT germplasm derived wheat varieties were performed very well in Sichuan in their resistance to stripe rust by incorporated some new resistant genes, the broken through of breeding for high quality by releasing of the first strong gluten varieties in Sichuan, and the broken through of breeding for high yield potential indicated by a new record of yield of 6.13 t/ha2 in provincial yield trial by new variety chuanmai 42. It is expected that in near future there will be more CIMMYT derived new wheat varieties to be released in Sichuan. All of these give us a confident information that CIMMYT germplasm and breeding strategies and breeding technologies are now one of the very important factors to create new technologies and develop new type of wheat varieties in Sichuan.
1. 1985年，四川省农科院小麦专家组第一次访问CIMMYT。
The first delegation of SAAS to CIMMYT in 1985.

2. 中国-CIMMYT小麦穿梭育种第一次会议在北京召开，庄巧生院士主持会议。
Held by Prof. Zhuang Qiaosheng the first meeting on China-CIMMYT shuttle breeding project in Beijing.

3. CIMMYT小麦部主任费歇尔率育种家布朗、病害专家科利来到四川省农科院访问、指导。
Dr. T. Fischer, Dr. H. Brown and Dr. M. Kohli visited SAAS firstly in 1989.

4. 1991年，CIMMYT第一任总主任汉森在汉森家会见了第二次赴CIMMYT开展穿梭育种工作的邹裕春等中国小麦专家。
The former DG of CIMMYT, Mr. Hanson met Mr. Zou Yuchun and other Chinese wheat breeders at his house during the second time to CIMMYT for carrying out the collaborative wheat shuttle breeding program.

5. 1992年，邹裕春先生第三次赴CIMMYT开展穿梭育种工作。
Mr. Zou Yuchun, Head of the collaborative wheat shuttle breeding program at Chengdu site, went to CIMMYT for the third time to carry out the shuttle breeding program.

6. 1989年，CIMMYT小麦首席科学家拉加拉姆博士在田间与中国第一个小麦穿梭育种代表团成员邹裕春等交谈。
In 1989, the principal wheat scientist of CIMMYT, Dr. S. Rajaram chatted with the members of the first Chinese delegation sent by CAAS to CIMMYT to implement the collaborative wheat shuttle breeding program. Head of Chengdu shuttle site, Mr. Zou Yuchun was one of the delegation members.
玉米领域的全面合作
QPM Cooperation between SAAS and CIMMYT

早在80年代中期，四川省农科院的玉米育种项目就与国际玉米小麦改良中心（CIMMYT）开始了技术交流，并派遣青年优秀专家赴CIMMYT学习。到90年代，双方的合作交流进一步加强和扩大，涉及到抗旱耐盐、抗纹枯病和优质蛋白育种领域，包括学术交流、人员培训、材料筛选、试验示范等。十多位CIMMYT的专家到四川进行学术交流和工作考察，我们也从CIMMYT引入了大量的抗旱耐盐、抗纹枯病和优质蛋白育种材料，促进了玉米育种项目的发展，选育的优良玉米杂交种在生产中推广利用。

优质蛋白玉米方面，张彪同志到CIMMYT学习期间，获得了一些优质蛋白玉米种质资源。90年代中期，国家育种攻关重视对优质蛋白玉米育种工作的支持，我们与CIMMYT的合作关系得到加强。1998年7月CIMMYT项目顾问委员会Shivaji Pandey和Hugo Cordova博士一行来到我所考察优质蛋白玉米的育种、试验和生产情况，10月Surinder Vasal博士又到我所了解和指导蛋白玉米的育种工作。1999年康继伟同志到CIMMYT学习和工作，回国后逐步引入CIMMYT的优质蛋白玉米种质资源，研究人员们通过利用CIMMYT的育种材料，育成了优质蛋白玉米杂交种成单201和成单202，促进了我省优质蛋白玉米生产的发展。

In mid 1980s, zhang biao, younger maize breeder, was firstly sent to CIMMYT for studying on maize breeding, and quality protein maize (QPM) germplasm was introduced to our maize program. Up to the mid-later 1900's, the National Coordinated Maize Breeding Program gave more support to the QPM breeding activities, and therefore the technical exchange with CIMMYT was actually strengthened. In July 1998, Dr. Shiviji Pandy, Dr. Surinder Vasal and other members of the CIMMYT project advisory committee arrived in Chengdu to make survey of our QPM breeding program and variety trials, and in October 1998, Dr. Surinder Vasal came again to our Institute for QPM work plan. In February 1999, Kang Jiwei arrived at CIMMYT-Mexico and participated in QPM breeding activities. Since then, we collected a large quantity of QPM germplasm from CIMMYT and also devoted major efforts toward a more exploitation of QPM germplasm. Over the years, our breeders developed tow QPM hybrids, Cheng Dan 201 and Cheng Dan 202, and released these varieties to farmers, promoted the development of QPM production in Sichuan.

1988年张彪在CIMMYT参加玉米育种技术培训
Zhang Biao attended maize breeding training course at CIMMYT in 1988

康继伟在CIMMYT参加玉米育种技术培训
Kang Jiwei attended maize breeding training course at CIMMYT in 1996
种质资源交换与利用
SAAS-CIMMYT germplasm exchanges

普通小麦种质资源的引进与利用：针对四川小麦种质资源的遗传背景狭窄和优质、抗病（特别是抗条锈病）基因缺乏的问题，SAAS先后从CIMMYT引进5000余份小麦种质资源，同时引进了先进的冬春杂交及穿梭育种技术。SAAS用这些引进的种质与具有矮秆、抗倒、早熟、多花、大穗、粒大等优良性状的四川种质进行杂交，成功选育出12个四川省19个川麦系列小麦品种，先后通过四川省和国家审定，同时还创造出一批抗病、优质、白皮抗爆发芽及特大穗等优异育种新材料，使四川小麦在产量、抗病性和品质等方面实现了重大突破。

川麦25、30、32、36、39等系列小麦品种都是用CIMMYT的种质培保成功的，它们的育成实现了四川小麦品种在产量、抗性和品质上的突破。优质强筋小麦新品种川麦36、川麦39，结束了四川不能培育和生产优质强筋的小麦的历史。目前，CIMMYT种质已成为四川育种的一个重要种质和亲本来源，对四川小麦品种改良发挥了十分重要的作用。

人工合成种的引进与利用：SAAS利用从CIMMYT引进的硬粒小麦补充杂交人工合成种，与四川小麦杂交，率先在世界上培育出一个高产小麦新品种川麦42型，之后又选育出川麦31和川麦47，并在生产上推广应用。

大麦资源的引进与利用：SAAS利用从CIMMYT引进的大麦资源，选育出大麦品种24、川麦大1号和川麦大2号等3个品种。

CIMMYT玉米种质资源的引进与利用：SAAS从CIMMYT引进优质、耐旱、抗纹枯病等玉米种质资源数百份，在精选、鉴定和研究的基础上，选育出玉米新品种单17、21和201、202等6个。在研究和评价CIMMYT的资源中，选中中国第一份抗纹枯病的抗源，并首次在中国范围内进行分子标记技术对该抗源的纹枯病抗性基因进行了定位。SAAS还与重庆市农科院合作，利用该抗源和分子标记辅助育种技术，在中国选育出一个抗纹枯病的玉米新品种诱变24号，通过审批后已在生产上推广应用。

四川小麦种质资源在CIMMYT的利用：在冬春杂交和穿梭育种模式下，四川的小麦种质资源，包括川麦18、川麦33、川麦37和川麦107等在内的1000多份小麦品种、高代品系及重要的赤霉病抗源，也被CIMMYT广泛用于杂交育种，或被引入其它国家。1995年，CIMMYT利用川麦18已培育出多个小麦品种，这些品种继承了四川小麦多花、早熟和抗粒型黑穗病的特性，其中，小麦品种CIMMYT13在墨西哥推广，对有效控制当地的一种毁灭性国际检疫病害——粒型黑穗病起到了重要的作用。CIMMYT还利用川麦30及其姊妹系SW96193、SW1862等作为亲本，选育出大量矮秆早熟、抗纹枯病的杂交后代。至1990年代后期，CIMMYT小麦育种课题中，约1/3的后代具有四川小麦的血缘。

粒黑穗病起到了重要的作用。CIMMYT还利用川麦30及其姊妹系SW96193、SW1862等作为亲本，选育出大量矮秆早熟、抗纹枯病的杂交后代。至1990年代后期，CIMMYT小麦育种课题中，约1/3的后代具有四川小麦的血缘。

Introduction and utilization of CIMMYT wheat germplasm: Around 5,000 accessions of wheat germplasm were introduced from CIMMYT to SAAS, as well as the advanced lines from winter x spring crosses and shuttle breeding technology. By crossing CIMMYT wheat germplasm with Sichuan local wheat varieties with agronomic traits of semi-dwarf, lodging resistance, multi-flower, large spike and large kernel, 12 wheat varieties, have been officially released.

Wheat varieties, such as Chuanmai 25, Chuanmai 30, Chuanmai 32, Chuanmai 36 and Chuanmai 39, all bred successfully with CIMMYT germplasm, which realized the breakthrough on wheat yield, resistance and quality in Sichuan. Chuanmai 30, is considered a milestone variety with high yield potential after Fan 6 and Miyang 11. Wheat varieties Chuanmai 36 and Chuanmai 39 are the only two wheat varieties with strong gluten released successfully in Sichuan at this moment. Their successful breeding and extension ended the history that there was no wheat variety with strong gluten in Sichuan.

By crossing CIMMYT synthetic hexaploid wheat with Sichuan variety, four new varieties were developed by SAAS. Chuanmai 42 was the first synthetic derivative released in the world.

Many varieties bred by SAAS with CIMMYT germplasm, such as Chuanmai 30 and Chuanmai 42 were also used as parents for improving the yield potential and disease resistance by other breeding programs in China.

Barley germplasm from CIMMYT: With the barley resources from CIMMYT, three barley varieties were bred by SAAS, these were V 24, Chundami 1 and Chundami 2. V 24 was of the high yield, 20% higher than check during the regional trial. It had extended up to 12 provinces nationwide after its release. In 1991, V 24 covered over 40,000 ha in Sichuan, accounting for 50% of the total barley sowing areas in Sichuan.

Maize germplasm introduction and utilization: Hundreds of maize germplasm with good quality, drought Tolerance and sheath blight resistance were introduced by SAAS. By using CIMMYT maize germplasm, six maize hybrids, such as Chengdang 17, Chengdang 18, Chengdang 201 and Chengdang 202, were released. Chengdang 201 was the first quality protein maize hybrid variety released in Sichuan. The first sheath blight resistance line was screened out from CIMMYT maize germplasm in China by SAAS. The sheath blight resistant genes were mapped by molecular marker. More importantly, in cooperation with Chongqing Academy of Agricultural Sciences, a new maize hybrid Yushu 24 with resistance to sheath blight, was developed and released by using MAS.

Utilization of Sichuan wheat germplasm at CIMMYT: Based on the China-CIMMYT shuttle breeding project, over 1000 Sichuan wheat germplasm, including Chuanmai 18, Chuanmai 33, Chuanmai 37 and Chuanmai 107, were also introduced into CIMMYT and widely used. In 1995, a number of wheat advanced lines and varieties, such as CBDR with the characters of multi-flower, multi-kernel, early maturity and resistance to Karnal bunt, were bred by using Chuanmai 18. Around one third of advanced lines for high rainfall environment at CIMMYT wheat breeding program process the pedigrees of Sichuan wheat.
Ravi Singh 博士观察CIMMYT资源抗条锈性
Dr. Ravi Singh evaluated the stripe rust resistance of CIMMYT wheat germplasm in Sichuan

人工合成小麦衍生后代遗传评价
Genetic evaluation on CIMMYT synthetic derivatives

川麦18已被CIMMYT作为重要种质资源广泛应用
Chuanmai18 has been widely used in CIMMYT wheat breeding program

从CIMMYT引进的节节麦资源
*Aegilops tauschii* introduced from CIMMYT

从CIMMYT引进的人工合成小麦资源
Synthetic hexaploid wheat introduced from CIMMYT

从CIMMYT引进的热带玉米种质
Tropic maize germplasm from CIMMYT
耕作领域的合作

Cooperation in Cropping System

农业制度及相关技术研究是CIMMYT的重要研究领域之一，特别是在垄作技术、保护性农业技术等方面成效显著。

1999年，经CIMMYT驻中国办事处主任何中虎博士推荐，四川省农科院耕作栽培中心执行主任郑家国研究员应邀参加CIMMYT和RWC（Rice-Wheat Consortium，南亚麦类联合体）共同举办的学术研讨会，并成为RWC理事会成员。第二年春，美国康奈尔大学教授、CIMMYT驻南亚地区代表PR Hobbs博士率RWC的专家来川开展农业制度和栽培技术交流。由此开启了CIMMYT和SAAS双方在耕作栽培领域的技术合作与交流。从2000年至今，开展了系列包括技术培训、交流考察、合作研究等在内的相关活动，取得了显著成效。

2000年，四川省农科院汤永禄副研究员随何中虎博士参加CIMMYT和RWC在南亚举办的技术交流，并向与会专家介绍了四川耕作栽培技术研究与应用情况。印度和巴基斯坦的农业专家对“小麦精量播种技术”和“水稻旱育抛秧技术”表现出浓厚兴趣。2001年，在PR Hobbs博士和CIMMYT的支持下，SAAS为南亚诸国制作了技术光盘和供电视台播放的专用录像带，将这两项简化高效高产技术引入南亚示范推广，效果良好，并正在加大推广力度。南亚各国先后组织5个专家代表团来川学习访问。

2002年秋，汤永禄赴CIMMYT接受高级技术培训。回国后，在稻麦轮作区开展小麦垄作技术探索研究，大力宣传CIMMYT等国际研究机构倡导的保护性耕作技术和保护性农业理念，并强化四川保护性耕作技术的研究与应用，成效显著。同时，在CIMMYT-SAAS合作平台上，四川省农业科学院的耕作栽培学科得到了提升和发展，不仅学术交流频繁，而且还争取到了南亚（巴基斯坦）节水农业、中澳（澳大利亚）可持续农业制度等国际合作项目。

汤永禄博士向出席CIMMYT亚太工作会的专家介绍四川保护性耕作技术研究应用情况

Dr Tang Yonglu introduced the advances on the resources conservation tillage in Sichuan to the scientists attending the IAP of CIMMYT

汤永禄博士与曾中虎博士、何中虎博士、黄钢博士等介绍水稻两熟制地区小麦垄作栽培研究情况

Dr Tang Yonglu introduced the raised-bed planting of wheat in rice wheat rotation region to Dr R.P. Singh and Dr. He Zhonghu

2004年南亚农业专家R.K.Gupta一行在广汉田间考察

Scientists from South Asia (Dr RK Gupta, the third from left) watching the simple seeder in the farmer’s field, at Guanhuang, Sichuan

郑家国研究员向来自美国康奈尔大学的Norman Uphoff教授介绍为水稻强化栽培提供旱茬口的稻田嫁接

Prof. Zheng Jiaqi introduced the mushroom field providing early crop rotation for SRI to Dr Norman Uphoff from Cornell University
SAAS-CIMMYT Cooperation in Cropping System

Study on cropping system and related technologies is one of the most important research fields of CIMMYT and it has a great success especially on Raised-bed planting and Conservation agricultural technology.

The cooperation in cropping system began with the visit of Professor Zheng Jiaguo, the director of the Tillage and Cultivation Centre of SAAS, to the workshop held by CIMMYT and RWC (Rice-Wheat Consortium) in India and he became the member of RWC council. In next year spring, Dr P. R. Hobbs, the professor of Cornell University and the CIMMYT agronomist, visited Sichuan with scientists of RWC and discussed the cooperation between two sides. Since his visiting, a series of activities including training, information exchange, and cooperative research have been held.

In 2000, Tang Yonglu, an agronomist of SAAS, introduced the outline of Sichuan’s agricultural production and some advanced cultivation techniques to the scientists attending the workshop held by CIMMYT and RWC in Pakistan and they showed great interest in the technique 'Precision surface seeding and mulching rice straw for wheat after rice' and the technique 'Dry-seedbed rice seedlings and broadcasting-rice seedling transplanting'. Next year SAAS made discs and TV-special tapes for the countries in South Asia funded by CIMMYT to extend these two advanced and useful techniques.

SAAS has been exploring Raised-bed planting for wheat and making great efforts to disseminate and study on conservation agriculture technology since Tang Yonglu came back from CIMMYT as a trainee in 2002. It is the cooperation between SAAS and CIMMYT that promote the development of cultivation in SAAS. And SAAS also obtained some international projects based on this cooperation.

2000年P.R.Hobbs博士、何中虎博士、汤永禄等在印度田间同农民开展技术交流
Group photo of scientists with Indian farmers
Dr PR Hobbs (the fourth from left), Dr. He Zhonghu (middle, bearing check T-shirt)

2005年，巴基斯坦农业技术研究中心Riaz A. Mann博士一行在四川考察农业
Dr. Tang Yonglu introduced the cropping system and its related technology in Sichuan to the delegation led by Riaz A. Mann from Pakistan Agricultural Research Centre.

为南亚制作的光盘和供电视台播放的BT带（小麦精量播种稻草覆盖技术和水稻旱育抛秧技术）
Discs and TV tapes made by SAAS about techniques of precision surface seeding and mulching rice straw for wheat after rice and the technique of dry-seedbed rice seedlings for South Asia countries funded by CIMMYT
技术交流
Exchange of Scientists and Information

SAAS与CIMMYT的合作最早开始于上世纪80年代初期。当时，CIMMYT的高级科学家访问了SAAS。据统计，先后有30多位CIMMYT或与CIMMYT有关的高级专家来我院参观、合作和交流，其中，包括现任世界银行副总裁、CGIAR主席Ian Johnson，秘书长Francisco Reifschneider和诺贝尔和平奖获得者、绿色革命之父、CIMMYT创始人诺尔曼·布劳格博士（Norman Borlaug），以及中国-CIMMYT小麦穿梭育种国际合作项目总主持人，CIMMYT首席小麦科学家拉加拉姆博士（S.Rajarama）等。

原四川省委副书记杨超华也率领包括我院专家在内的考察团访问了CIMMYT。我院先后派出20多名科技人员到CIMMYT访问、学习或开展合作研究。他们已成为四川农业科技的中坚力量，他们中有2人担任了SAAS领导、6人成为CRI的领导、6人成为四川省学术技术带头人、8人主持了四川省育种攻关项目。

SAAS与CIMMYT合作，在成都召开了2次全国性的小麦条锈病研讨会，SAAS还承办了2005年CIMMYT在成都召开的CIMMYT亚太地区区域会议。

The cooperation between SAAS and CIMMYT was initiated in early 1980s, when CIMMYT senior scientists visited SAAS. More than 30 scientists from CIMMYT or related institutions visited SAAS, including Dr. Ian Johnson, the Vice President of World Bank and chairman of CGIAR, Dr. Francisco Reifschneider, Secretary General of CGIAR, Dr. Norman Borlaug, the Noble Peace Laureate, Dr. Rajaram, the former Director of CIMMYT wheat program.

A delegation including members from SAAS, led by Mr. Yang Chonghui, former vice governor of Sichuan, visited CIMMYT. Nearly 20 scientists from SAAS went to CIMMYT for training or cooperative research. After coming back, among them two have become the president and vice president of SAAS, two become the leaders of the Crop Science Institute, and four become leading scientists in Sichuan Province.

In cooperation with CIMMYT, SAAS organized two national wheat stripe rust symposiums. In 2005, CIMMYT Intensive Agriculture Program meeting was held in Chengdu. In April 2007, CIMMYT board meeting will be held in Sichuan.

郭永祥副省长在田间考察用CIMMYT人工合成种育成的小麦新品种川麦42
Vice governor of Sichuan Mr. Guo Yongxiang, in field to inspect new wheat variety Chuanmai42 derived from CIMMYT synthetics

张中伟省长在田间与拉加拉姆博士亲切握手（1999年）
Mr. Zhang Zhongwei, the governor of Sichuan, handing with Dr. Rajaram in wheat field in 1999
1985年，四川省农科院作物所所长、农学家余道和小麦育种家宋荷仙、邹裕春、饶世达访问CIMMYT
Former director of the Crop Research Institute of SAAS Prof. Yu Yao and wheat breeders (Song Hexian, Zou Yuchun, Rao Shida) visited CIMMYT in 1985

1986年，CIMMYT小麦病害专家杜宾博士和大麦育种专家维瓦博士访问四川省农科院
CIMMYT wheat scientist Dr. H. Dubin and barley breeder Dr. H. Vivar visited SAAS, in 1986

1987年，CIMMYT小麦育种家W. Pfeiffer博士、小麦病理学家Towes博士和小麦品质实验室主任Amaya博士访问四川省农科院
In 1987, CIMMYT wheat breeder Dr. W. Pfeiffer, wheat pathologist Dr. Towes and the director of wheat quality lab of CIMMYT Dr. Amaya visited to SAAS

1988年，CIMMYT小麦科学家Bekele博士、Fuentes博士访问四川省农科院
Wheat scientists Dr. Bekele and Dr. Fuentes visited SAAS from CIMMYT in 1988

1992年，CIMMYT小麦项目部主任、小麦育种家S. Rajaram博士访问四川省农科院
Dr. S. Rajaram, the Director of CIMMYT Wheat Program, visited SAAS to exchange ideas and give advices on collaborative wheat shuttle breeding program at Sichuan site, in 1992

1998年，CIMMYT大麦育种专家维瓦（Vivar）再次来四川省农科院指导大麦特别是裸粒饲用大麦的选育工作
In 1998, Barley breeder from CIMMYT Dr. H. Vivar visited SAAS again to discuss the development of naked barley in Sichuan for feeding
Vice Secretary General of Sichuan Provincial Government Mr. Tang Jianjun (the second from left) to inspect high quality new wheat variety Chuanmai36 in field in Guanghan

The officer of Sichuan government giving the 'Golden summit Prize' to Dr. Rajaram for his great contribution to Sichuan province

Dr. Rajaram with wheat breeders of SAAS

Dr. He Zhonghu, the CIMMYT liaison officer in Beijing, and CIMMYT wheat scientist Dr. Ravi Singh visited farmer's wheat fields at Lianshan Town, Guanghan
1. CIMMY的经济学家John Dixon博士和孟庆惠博士来川调研合成小麦和保护性栽培。
Dr. John Dixon and Dr. Erika C. H. Meng of CIMMYT making survey on impacting of synthetic derivatives and conservation tillage to farmers in Sichuan.

2. Ravi Singh博士和邹裕春研究员在并观考察持久抗性表现
Dr. Ravi Singh with Prof. Zou working on durable resistances of stripe rust, in Jingyan county.

3. 1996年，邹裕春先生出席在土耳其召开的第五届国际小麦研讨会
Supported by CIMMYT, Mr. Zou Yuchun attended the 5th IWC in Ankara, Turkey.
From left to right: Dr. S. Rajaram, Dr. Ravi Singh, Dr. He Zhonghu, Prof. Zou Yuchun.

4. 澳大利亚Mark Sutherland博士等一行考察小麦专家大院
Australian delegation led by Mark Sutherland visited the Wheat Expert Yard, the research and extension station of SAAS at Guanghan, Deyang.

5. Dr. K. Sayre博士和R. K. Gupta博士参观四川保护性耕作试验田
Dr. K. Sayre and Dr. R. K. Gupta visited farmers' fields under conservation tillage.

6. 2000年，四川省农科院作物所邹裕春先生和刘仲齐博士出席在匈牙利召开的第六届国际小麦研讨会
技术培训
TRAINING

技术培训是CIMMYT的重要任务之一。四川省农业科学院先后派出20多名科技人员到CIMMYT访问、学习或开展合作研究。他们已成为四川农业育种的中坚力量，其中有2人担任了SAAS领导，6人成为四川省农科院作物所的领导，6人成为四川省学术技术带头人，8人主主持了四川省育种攻关项目。

Over 20 scientists SAAS went to CIMMYT for visiting, training or cooperative research. After coming back, two of them have been promoted to the position of leadership of SAAS, another two the position of leadership of the institutes under SAAS, and 6 scientists have won the honor of the leading scientists on academic by the provincial government.

CIMMYT副主任G.Varughese博士授予李跃建小麦育种培训班结业证书
Dr. G. Varughese the deputy of CIMMYT, issued the diploma of wheat Training course to Li Yuejian

黄钢在CIMMYT参加小麦育种培训
Huang Gang attended wheat breeding training Course at CIMMYT in 1992
Dr. RL Villarreal with Li Yuejian and other trainees from different countries at CIMMYT

Dr. Rajaram was making demonstration on the selection of wheat in CIMMYT field

Prof. Yu Yao and Song Hexian in wheat field of CIMMYT

Wheat experts of SAAS at CIMMYT
CIMMYT中心主任D. Winklemann博士颁发培训证书
Dr. D. Winklemann, the DG of CIMMYT, issued the diploma of maize training course to Zhang Biao

2000年，小麦育种家邹裕春在墨西哥农民田间访问
Prof. Zou Yuchuan visited farmer's wheat field in Mexico in 2000

Mujeeb-kazi A. 博士向参加小麦高级培训班的学员讲解人工合成小麦研究
Dr. Mujeeb-kazi A. giving lecture to wheat trainees on the procedure of synthetics development

2000年，S. Rajaram博士向邹裕春先生颁发培训证书
Dr. S. Rajaram issued the diploma of wheat advanced training course to Mr. Zou Yuchun from SAAS in 2000

四川省农科院小麦育种专家宋荷仙在CIMMYT实验室
Ms Song Hexian, wheat breeder of SAAS, in wheat quality lab. at CIMMYT

1995年，杨武云参加CIMMYT小麦培训
Yang Wuyun as wheat trainee at CIMMYT in 1995
1996年，康继伟参加CIMMYT玉米培训
Kang Jiwei as maize trainee at CIMMYT in 1996

2002年，朱华忠在CIMMYT向土耳其科学家介绍抗病小麦川麦33
Zhu Huazhong introducing Chuanmai 33 with good yellow rust
tolerance to Turkey scientist in 2002

朱华忠在CIMMYT谷物实验室学习选育良种
Mr. Zhu Huazhong, wheat breeder of SAAS, in wheat quality
lab. at CIMMYT

Ms Wu Ling, wheat breeder of SAAS, attended bio-technology
training course at CIMMYT in 1998

汤永禄与K.D. Sayre博士讨论保护性耕作
Tang Yongliu was discussing with Dr. K. Sayre about
conservation tillage

汤永禄与参加CIMMYT高级技术培训的其他学员在一起
Group photo of trainees in CIMMYT from nine countries (Dr. Ivan
Ortiz-Monasterio, the fourth from left)
代表性成果

Representative Varieties

总体情况：
利用CIMMYT种质资源在四川已育成小麦新品种19个、大麦品种9个、优质玉米品种2个，并在条锈病抗源、强筋优质和高产育种上都有新的突破。

突出品种：
川麦30在四川连续4年创造大面积亩产过500kg的高产纪录，累计推广面积177万公顷，获四川省政府科技进步二等奖，农业部丰收奖二等奖。

川麦32是90年代中期四川条锈病生理小种爆发时全省唯一在大面积上推广的高抗条锈病的小麦新品种，同时还通过了国家审定。

川麦36、川麦39是CIMMYT Milan选系的衍生后代，是四川目前为止审定的唯一强筋小麦新品种，实现了四川小麦育种在品质上的突破。

川麦42是利用CIMMYT硬粒小麦-节节麦人工合成种与CIMMYT材料衍生后代川麦30育成的世界首例商用小麦新品种，在全省区试中创造了开展区试以来最高单产纪录（6.13 t/ha），通过四川和国家审定，创造了大面积稳定实现7.5t/ha的高产纪录。

V24：产量潜力很高，比对照增产20%以上，审定后在全国12个省推广应用，1991年在四川推广60多万亩，占全省大麦面积的50%，累计推广面积达260多万亩，获四川省科技进步三等奖。

成单201、202：成单201全籽粒赖氨酸的含量0.42%，比普通玉米高80%以上。区试平均亩产557.7公斤，比对照中单二号增产13.3%，位居第一。累计推广面积80万亩。成单202省区试2年平均亩产482公斤，比对照中单14增产11.5%，居第一位。2002年通过四川省审定，列为重点推广品种，累计推广面积150万亩。

12 wheat varieties, 3 barley varieties and 2 quality protein maize hybrid varieties have been officially released by using CIMMYT germplasm.

Chuanmai 30 is considered a milestone variety after Fan 6 and Mianyang 11. During the continuous 3 years demonstration with 9 different ecological areas in Sichuan, its yield was up to 7500 kg/ha, which created the highest record at different ecological wheat producing areas. It was cultivated 1.77 million ha in Sichuan.

Chuanmai32 was the only wheat variety with highly resistance to stripe rust cultivated in Sichuan in the middle of 1990s.

Two new Milan derivatives Chuanmai 36 and Chuanmai 39 are the first bread wheat with good baking quality released in Sichuan and the upper region of Yangzi river, respectively.

Chuanmai 42 is the first released wheat variety derived from CIMMYT synthetic hexaploid wheat in the world. Its yield ranked the first at the Sichuan provincial yield trial and Nation yield trial.

V24 was a high yield potential barley variety selected from CIMMYT barley germplasm. It was of the high yield, 20% higher than check during the Sichuan provincial yield trial. It had extended up to 12 provinces nationwide after its release. In 1991, it covered over 40000 ha in Sichuan, accounting for 50% of the total barley sowing areas in Sichuan.
<table>
<thead>
<tr>
<th>序 No.</th>
<th>品 种 Variety</th>
<th>组 合 Cross</th>
<th>育成单位 Breeding Organization</th>
<th>审定时间 Released time</th>
<th>审定级别 Registration level</th>
<th>说明 Notes</th>
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<tr>
<td>1</td>
<td>川麦25 Chuanmai25</td>
<td>(1414×川育5号)×84LH</td>
<td>四川省农科院作物所</td>
<td>1994</td>
<td>四川省审定</td>
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<td>四川省农科院作物所</td>
<td>2001</td>
<td>四川省审定</td>
<td>Ning8439为CIMMYT第一届长江赛中CIMMYT从南京送去的材料的选系</td>
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<td>四川省审定</td>
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<td>2003</td>
<td>四川省审定</td>
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品种编译 by using the germplasm from CIMMYT (wheat 19; barley 3; maize 2)
Yield measuring in farmer's field

L: susceptible variety  R: Chuanmai30
川麦32 Chuanmai32
大麦威24 Barley Variety V24

大麦品种‘威24’是从CIMMYT国际大麦圃中V24系选而成，于1989年通过四川省审定。在试验中比对照增产20%以上，先后在全国12个省推广应用，1991年在四川的推广面积达60多万亩，占全省大麦面积的50%。累计推广面积达260多万亩，获四川省科技进步三等奖。

The barley variety of Wei24 was bred based on the V24 from CIMMYT and released in Sichuan province in 1989. Its grain yield was higher by over 20% than check in trials and it was widely planted in 12 provinces of China. The planted area of this variety reached up to 170 thousand hectares taking up over 50% of total barley area in 1991.

成单201 Cheng dan 201

谭中和、李跃建、黄钢等院所领导考察大麦品种‘威24’
Leaders of SAAS, Mr. Tan Zhonghe, Li Yuejian and Huang Gang, Visited the field of barley variety ‘V24’

成单202 Cheng dan 202
SAAS-CIMMYT科技合作展望
Prospects of the Cooperation between SAAS and CIMMYT

成功的经验与启示:
1. 互利共赢是双方成功合作的基础。从一开始，双方就在种质资源共享、科学家互访、经验与信息资源共享等方面达成一致，使合作迅速发展。当然，SAAS从CIMMYT获得的远比给予的更大得多。

2. 依靠科学带头人和学科团队是关键。学科带头人是启动和推动合作的关键性因素，学科团队是吸收合作成果、不断深化合作的基础，两者相辅相成，缺一不可。拉加拉姆博士、瓦维森博士和邹裕春研究员为双方的合作做出了极大的贡献。

3. 人才培养是合作持续深入的动力。合作需要人才培养，合作要不断培养年轻的合作人才，更要培养年轻的新一代人才。只有这样，才能使合作的成果更丰富，合作的带动效应更大，合作也才更加具有吸引力。

4. 领导重视和支持是成功合作的重要保障。国际合作涉及的决不只是合作对象的合作项目本身，而是一个涉及面很广的系统工程。因此，各级领导的支持是项目取得成功的保障。在SAAS与CIMMYT的合作启动之初，当时的四川农科院和四川农科院作物所都全力支持。时任作物所长的余业研究员不仅赴CIMMYT考察，确定合作重点，还为合作做出了很多具体贡献。

下一步深化合作之重点：
回顾和总结SAAS-CIMMYT的合作历程，SAAS认为，应在原有基础上，进一步加强以下几方面的工作：
1. 提高合作层次和质量。双方签署长期合作协议，建立明晰的战略合作框架，进一步在小麦、玉米育种和农艺技术研究上明确具体内容形式和形式，形成长期共赢的合作伙伴。

2. 深化和丰富合作方式。进一步加强小麦条锈病的抗性、品质改良、白皮抗旱发芽和耐寒不育的交换利用；加强玉米品质、脱毒、抗病（抗早枯病）等资源的引进和利用；加强生物技术育种合作；将SAAS与CIMMYT合作的育种和农艺研究成果、经验向同类发展中国家推广。

3. 继续加强对青年科技人员的培训，加大人员互派，促进学术和信息交流。特别要通过多种形式和手段培养青年科技人员，促进他们成为作物研究、创新与合作的主力军。

4. 积极推进在四川设立面向中国和东南亚国家的CIMMYT-CHINA南方玉米、小麦育种试验站。

5. 多渠道筹集合作经费。SAAS和CIMMYT要通过多种方式筹集经费，推动合作持续深入发展。

Experience Review and the Prospects of SAAS-CIMMYT Collaboration
After the long period of cooperation, we felt that some basic experience could be cited as follows:
1) Mutual benefit and win-win is the base for long term cooperation.
2) Exchange of germplasm and scientists has brought great benefits to both sides.
3) The leading scientist and a united research team is a key factor for conducting such as international cooperation. Dr. S. Rajaram, Dr. Ravi Singh and Prof. Zou Yuechun all made great contributions to the cooperation from both sides.
4) In addition, training young scientists in CIMMYT and giving them chances to work in collaborative research team is another important factor for ensuring the success of collaboration.
5) Support provided by leaders at different levels is the guarantee for success. At the beginning of the SAAS-CIMMYT cooperation, it obtained the full support from both SAAS and Crop Science Institute. Prof. Yu Yao, the Director of Crop Science Institute, visited CIMMYT, decided the cooperative priorities and provided full support. Moreover, since the establishment of the CIMMYT Beijing office, it provided strong support in promoting the cooperation between SAAS and CIMMYT.

For future, by reviewing the cooperation between SAAS-CIMMYT, we suggest that priorities must be emphasized on the following aspects:
1) To strengthen the cooperation by signing bilateral long term cooperation agreement, making the strategic cooperation framework clearly and specifying the research activity and pattern on wheat, maize breeding and agronomic technology.
2) To deepen and enrich the cooperation pattern, especially to maintain the exchanges and utilization on germplasm. Strengthen the germplasm exchanges and utilization on durable resistance to wheat stripe rust, quality improvement, sprouting resistance for white kernel wheat. Strengthen the introduction of maize germplasm with resistance to sheath blight. Strengthen the cooperation on utilization of biotechnology to practical breeding. Extend the results and experiences on breeding and crop management between SAAS-CIMMYT to other developing countries.
3) To enhance the training. Increase the exchanges on researchers and promote the academic and information exchanges. Both sides need to pay very much attention to foster the young scientists through many ways to make them a vigorous team in agricultural research and cooperation with CIMMYT.
4) To establish the CIMMYT maize and wheat breeding experimental station in Sichuan targeting at China and other southeastern countries.
5) SAAS and CIMMYT jointly search for more funds through numerous channels for enhancing the cooperation.
小麦穿梭育种展望
Prospects of the Cooperation of Wheat Shuttle Breeding

通过双方科学家多年来的摸索、交流，双方都已初步建立起来适应穿梭育种合作需要的育种新体系，将大大提高育种水平和育种效率。双方交换、引进的种质，经过观察、筛选和改进、创新与积累，在已经选定推广19个小麦新品种：3个大麦新品种的基础上，预计将来会有更多的新品种陆续通过省和国家审定。近年来，在更成功的合作的基础上，双方科学家已经在拓展合作领域和合作范围以及如何深化与更加紧密合作方面进行了有效探索，新的合作研究项目已初步形成。

针对四川小麦条锈病生理小种变化频繁，常规造成小麦生产严重损失这一严峻形势，从2000年开始，双方科学家决定开展小麦抗病多基因持久抗性育种项目合作。四川省农科院作物所选择丰产性及适应性都好且高感条锈病的四川育成小麦品种或稳定高代选系送往CIMMYT，与CIMMYT具有抗条锈病多基因持久抗性且品质也较好的选系进行杂交、杂交后代再在双方穿梭选育。至2007年，已有近200份高代选系转入产量比较观察及抗性评价。以现有持久抗性育种项目和四川地方抗病育种为基础，如何进一步研究在四川这种小种变化十分频繁的条锈病热点地区的持久抗性表现规律、抗条锈病筛选、新品种选育，持久抗性与主基因抗性能否有效结合等，都是双方科学家正在思考和探索的问题。

四川地少人多，保证粮食供给始终是政府关注的民生头等大事。小麦如何进一步提高产量潜力，也是双方科学家在小麦品种改良中首要努力方向。四川省农科院作物所从CIMMYT引进的人工合成种与CIMMYT衍生品种川麦30杂交，育成了世界首例商用普通小麦新品种川麦42。川麦42在全省区试中创造了区试以来最高单产纪录（6.13 t/hm²），而且在国家区域试验的长江上游组中也名列前茅，也是长江上游育区中一个区处亩产超过400公斤的国家审定小麦品种，表现出很好的高产潜力与较的适应性。川麦为42为基础，广适应、高丰产潜力型小麦品种的遗传、生理和栽培配套技术的研究以及育种新材料的筛选、创造等，也已逐步着手进行。

在与CIMMYT合作研究的基础上，2000-2006年，四川省农科院作物所与澳大利亚的ACIAR实施了以质量改良为重点的合作研究计划，取得了意想不到的成功。影响四川小麦品种的遗传与环境因子，初步筛选出一批优质稳定表达材料并探索快速育种、利用的分子技术，为我们的CIMMYT的下一步合作研究奠定了良好的基础。

近年来，四川省农科院作物所的小麦及水稻栽培专家也积极参与了CIMMYT小麦育作技术示范及南亚地区稻麦耕作模式研究。分院专家研究的保护性简化的栽作技术，已在南亚地区CIMMYT合作地区推广应用，我所在印度、巴基斯坦培训人员，CIMMYT还组织南亚国家的专家来四川考察。在这些合作研究的基础上，高产优质的节约环保型简化的栽培体系开发及效益评价，将是SAAS与CIMMYT进一步深化合作的主要方向之一。

双方科学家间加强合作和继续强化对青年专家的培训是进一步取得合作成功的重要保证。目前，四川省政府正在与CIMMYT商讨进一步深化合作并在四川省农科院建立CIMMYT南方试验站等事宜，这必将为双方科学家提供一个更加坚实的合作平台。
Prospects of the Cooperation of Wheat Shuttle Breeding Program between SAAS and CIMMYT

After worked together on wheat shuttle breeding for a long period of wheat scientists both in SAAS and CIMMYT, some new and more efficiency breeding system has been reformed. Through the exchange of wheat germplasm and the creation and improvement of introduced materials, lots of new and promising lines are being developed. It is expected that some more new varieties will be released from both provincial level and national level in the near future besides the already released 19 wheat varieties in Sichuan. For future, the collaboration of Sichuan-CIMMYT on wheat breeding should be continued and strengthened. Recent years, some quite new and more interesting research areas in improving wheat breeding in both side are identified by CIMMYT and Sichuan scientists.

a. Started from middle 1990s, new races of stripe rust changed very fast and the epidemic of yellow rust in Sichuan and connected provinces like Gansu, Shanxi and Yunnan was very severe and a big yield loss was happened almost every year. Initiated from 2000, scientists from both SAAS and CIMMYT decided to carry out a special shuttle program on durable resistance in Sichuan to see if this method works or not under Sichuan wheat rust environments. In 2007 about 200 durable resistance lines were planted in yield trial and checked the resistance by pathologists in Sichuan. Based on present research and some core-germplasm in Sichuan studies and new varieties development on durable stripe rust resistance in Sichuan, and in particularly the exploitation of new resource of durable resistant new genes should be continued;

b. High yielding is always the first objective for wheat breeders in Sichuan because the big and increasing population and the limited farming resources we are facing. The development of new type of breeding materials with high yielding potential and good adaptation is especially important in our breeding research while we already climbed on a new yield plateau. The first common bread wheat variety derived from CIMMYT synthetics the Chuanmai 42 offers us a very good direction for combining the high yielding with good adaptation. Some more deep researches on their genetics are under being conducted using molecular technique.

c. Screening and developing new breeding materials and varieties of stable performance on high quality characters particularly for high quality noodles under relatively poor Sichuan ecological environments on quality is another important task for Sichuan breeders since the rapid development of marketing economic system in China;

d. Exploiting the new cultivation systems for high yield with high quality under more saving, easy operating for farmer, resource conservation and more environment protection is becoming the more important directions for the continuous development on agriculture in Sichuan and the world. Some cooperative researches conducted recent years between SAAS and CIMMYT had shown very promising results for future.

To ensure the cooperation between SAAS and CIMMYT could be continuing insistently and maintain more active, more efficient and more fruitful, it is especially important that the training of young scientists from Sichuan in CIMMYT and the exchanging of scientists through some special studies and programs should be continued and strengthened. The newly proposed collaborative plan on setting up a Co-Research-Station in SAAS must offer scientists both in SAAS and CIMMYT a very helpful and more efficiency coo-working plateau.
闲暇时光
Sweet Time
SAAS-CIMMYT 科技合作 大事纪

1. 1966  第一个由CIMMYT育成的小麦品种（Penjamo 62）引入四川种植，使四川小麦育种家及农民知道了接触到了“墨西哥小麦”。

2. 1967-83 先后有20余份CIMMYT育成的小麦品种被引入四川，但经过多年田间种植筛选，没有一份能在产量及适应性上超过当时四川自育品种“繁六”和“绵阳11号”。

3. 1984 第一位四川省农科院小麦育种家邹裕春随美国俄勒冈州立大学（Oregon State University, USA）科学特德教授（Prof. W. Kronstad）访问CIMMYT。这是四川省农科院第一位小麦育种家第一次访问CIMMYT。这次访问给他留下了深刻的印象。他使CIMMYT的小麦育种有了初步的了解。在访问中，邹裕春会见了CIMMYT小麦部主任科蒂斯（B. Curtis），副主任克拉特（A. Klatt）及小麦育种家拉加拉姆（S. Rajaram）并且介绍了四川小麦生产及育种情况。他们对四川小麦感到极大兴趣。1984年邹裕春回川后即开始每年从CIMMYT引进3-5个不同类型的国际小麦试验种在成都条件下种植观察及筛选。

4. 1984 CIMMYT小麦部主任克拉特（A. Klatt）率团访问中国并专程来四川省农科院访问。这是CIMMYT小麦专业第一次访问四川，四川的小麦生产及育种给他们留下了深刻印象。

5. 1985 CIMMYT小麦专家贝克勒（Bekele）访问四川省农科院。这是CIMMYT小麦部主任克拉特率团访问我院后派出的第一个专家组来院。

6. 1985 应CIMMYT邀请，四川省农科院作物所小麦育种家饶世达赴CIMMYT做小麦抗赤霉病短期合作研究。这是四川省农科院第一位赴CIMMYT短期合作研究的小麦专家。

7. 1985 应CIMMYT邀请并提供经费支持，四川省农科院作物所小麦栽培专家余道及小麦育种家宋荷仙、邹裕春访问CIMMYT。这是四川省农科院第一个小麦专家组访问CIMMYT，使他们对CIMMYT小麦育种有了直接的了解。访问期间，余道等还经历了一生中最大的墨西哥大地震，也体会到了CIMMYT这种大型国际组织的纯正工作。

8. 1986 CIMMYT小麦病害专家杜宾（H. Dubin）与大麦育种专家维瓦（H. Vivar）来四川省农科院访问、考察。

9. 1987 CIMMYT小麦育种家普菲弗（W. Pfeiffer），小麦品质实验室主任阿马雅（Amaya）及病害专家托维斯（Towes）来四川省农科院访问、考察。

10. 1987 四川省农科院作物所小麦育种家邹裕春收到由CIMMYT小麦部主任克拉特（A. Klatt）签署的“中国农科院-CIMMYT小麦穿梭育种合作协议”征求中方意见的文件一份。协议书建议将南京、成都、哈尔滨作为中国南方的三个春麦穿梭点。

11. 1988 CIMMYT小麦育种家贝克勒（Bekele）与芬特斯（Fuentes）来院考察、访问。


13. 1988 四川省农业科学院作物研究所青年玉米育种家张彪赴CIMMYT参加玉米育种技术培训。

14. 1989 庄巧生院士在北京主持召开了全国小麦穿梭育种工作会，四川省农科院作物所余道及CIMMYT小麦穿梭育种项目成都点负责人邹裕春出席了会议。CIMMYT小麦部主任费歇尔（T. Fischer）率小麦育种家隆（H. Brown）、病害专家科利（M. Kohli）出席了会议。

15. 1989 CIMMYT小麦部主任费歇尔（T. Fischer）率育种家布朗（H. Brown）、病害专家科利（M. Kohli）来四川省农科院访问、指导，这是中国农科院-CIMMYT小麦穿梭育种合作协议签署以来院的第一个CIMMYT小麦专家组。四川省副省长孟俊修及四川省农科院院长游述麟等会见并宴请了费歇尔等官员、专家。

17. 1989 四川省农科院作物所青年小麦育种家李跃建赴CIMMYT培训。这是‘中国农科院-CIMMYT小麦穿梭育种合作协定’签署后，四川省农科院派出的第一位赴CIMMYT培训的青年小麦专家。李跃建培训回院后，继续从事小麦育种研究及行政领导工作并获得博士学位。2000年，他主持选育的小麦新品系川麦107通过四川省审定和国家审定，并于2006年获国家科技进步二等奖，李跃建现已升任四川省农科院院长、四川省学科带头人、四川省作物学会理事长等要职。


19. 1989 由美国出版的介绍CIMMYT小麦育种经验的书‘小麦产量的遗传改良’(Genetic Improvement in Yield of Wheat)由我院作物所小麦育种家邹裕春等翻译出版发行。

20. 1991 四川省农科院作物所小麦育种家邹裕春第二次赴CIMMYT执行小麦穿梭育种合作任务。在四川育成第一个小麦强筋新品种川麦36、川麦39和在全省育成小麦新品种最多的CIMMYT新品系米兰，就是邹裕春在此次从CIMMYT选择带回的。10余年来在四川的栽培观察表明，米兰选系在四川不仅是非常重要的优质强筋资源，而且还为四川提供了一份很好的品种抗病育种中发挥更大作用。

21. 1992 四川省农科院作物所青年小麦专家黄钢赴CIMMYT培训，1997年黄钢再次赴CIMMYT培训。黄钢现任已是四川省著名小麦栽培专家，省学科带头人，四川省农科院副院长。

22. 1992 四川省农科院作物所青年小麦育种家朱华忠赴CIMMYT参加短期小麦品质合作研究。2002年朱华忠再次赴CIMMYT参加小麦项目高级培训班，2006年赴CIMMYT参加短期小麦抗锈病合作研究。现在朱华忠博士已担任四川省农科院作物所小麦中心主任。


24. 1992 四川省农科院作物所小麦育种家邹裕春第三次赴CIMMYT执行小麦穿梭育种合作任务。此次在CIMMYT期间，与CIMMYT小麦部部长、首席小麦育种家拉加拉姆（S. Rajaram）讨论、确定了由四川省农科院作物所小麦专家邹裕春等翻译出版专门介绍CIMMYT小麦育种理念、策略、方法及成功经验的选集‘CIMMYT的小麦育种’一书的具体计划。

25. 1994 第一个用CIMMYT小麦品种（Genaro 80）育成的四川小麦新品种川麦25在四川通过审定。

26. 1994 专门介绍CIMMYT小麦育种理念、策略、方法及成功经验的选集‘CIMMYT的小麦育种’，由四川省农科院作物所小麦专家邹裕春等翻译出版。此书后来被指定为中国青年小麦专家在CIMMYT培训时的必读参考书。此书也曾被送到国内各农业大学图书馆，让更多中国青年农学家了解CIMMYT。与此同时，CIMMYT小麦部部长、首席小麦育种家拉加拉姆（S. Rajaram）再次来院指导小麦穿梭育种合作。

27. 1995 四川省农科院作物所青年小麦专家杨武云赴CIMMYT培训。杨武云博士现在已是四川省农科院作物所副所长，四川省学术带头人。他用在培训期间从CIMMYT带回的今天人合成种，育成了世界上第一个普通小麦商用小麦新品种川麦42，受到国际同行的广泛赞誉。

28. 1995 四川省农科院作物所小麦育种家邹裕春第四次赴CIMMYT执行小麦穿梭育种合作任务。
29. 1996 CIMMYT小麦部副主任首长小麦育种家拉加拉姆（S. Rajaram）第三次来院指导小麦穿梭育种合作。拉加拉姆此间期间，还出席了CIMMYT小麦穿梭育成新品系SW3243（后改定名川麦30）在什邡市举行的高产田现场验收及全省示范工作会。在会上，四川省副省长刘昌杰、省政府秘书长任俊修、省科委主任等会均见了拉加拉姆。

30. 1996 在CIMMYT的资助下，四川省农科院作物所小麦育种家邹裕春出席了在土耳其举行的第五届国际小麦研讨会。会上，邹裕春宣布了论文，介绍了10年来四川与CIMMYT小麦穿梭育种合作的进展、成果及经验，受到与会科学家特别是西亚国家专家的高度赞赏，纷纷发言希望能与CIMMYT开展小麦的穿梭育种合作。

31. 1996 由于在与CIMMYT等的国际合作中取得的突出成果，CIMMYT小麦穿梭合作项目成都点负责人、我院作物所小麦育种家邹裕春，被国家科委、计委、农业部及国家引智办等四部委联合授予“全国引智先进个人”称号。

32. 1996 四川省农业科学院作物研究所青年玉米育种家廖继纯赴CIMMYT参加玉米育种技术培训。

33. 1997 CIMMYT北京办事处成立，大大加强了与四川合作的直接指导。同年，四川省农科院作物所青年小麦专家黄钢再次赴CIMMYT培训。

34. 1998 CIMMYT小麦部前主任费歇尔（T. Fischer）与CIMMYT北京办事处主任何中虎博士再次来川指导并商讨澳大利亚ACIAR与四川小麦合作等事宜。

35. 1998 CIMMYT大麦育种专家维瓦（Vivar）再次来院指导四川大麦新品种选育，特别是裸粒大麦的选育。

36. 1998 四川省农科院作物所青年小麦育种专家伍玲赴CIMMYT参加生物技术培训。

37. 1998 CIMMYT北京办事处主任何中虎博士来院参加用CIMMYT小麦种质育成的小麦新品系SW3243（后改定名川麦30）在上海等地的高产试验田的现场观摩验收。

38. 1998 用CIMMYT小麦种质在四川育成的第二个小麦新品系SW3243通过四川省审定，定名川麦30。由于川麦30具有矮秆抗倒、多穗大穗、白皮大粒等的生育特性，且又矮秆早熟非常适合四川多熟间套种植，以及能抗抗条锈病等特性，被列为四川省重点推广的脱毒新品种，在四川省科技厅及省农业厅组织的一系列农民大田生产示范中，连续2-3年在常平、什邡、广汉等低，浅丘（简阳、资中等）、丘区（宣汉、巴中、平昌等）以及攀枝花亚热带河谷山地等不同生态区都创造了亩产450-540公斤的全省各种生态区最高纪录。川麦30的矮秆抗倒、多穗大穗、白皮大粒和早熟、中抗条锈病等特性，还是一株难得的优秀良种。创四川小麦区试最高产纪录的世界第一个用人工合成种育成的普通小麦新品种川麦42的一个主要亲本就是川麦30：2006年刚通过四川省审定的在省区试中连续两年均增产10%以上的另一个小麦高产新品种川麦20，就是用川麦30育成的。

39. 1998 1998年7月，CIMMYT项目顾问委员会Shivaji Pandey和Hugo Cordova博士等一行来到四川省农科院作物所考察优质蛋白玉米的育种、试验和生产情况。10月，Surinder Vasal博士又前来了解和指导玉米的育种工作。

40. 1999 四川省副省长杨崇汇及四川省农科院副院长谭和平访问CIMMYT，增进了双方相互了解，也使四川省领导更加支持我院与CIMMYT合作的支持。

41. 1999 CIMMYT小麦部主任、首长小麦育种家拉加拉姆（S. Rajaram）再次来院指导小麦穿梭育种合作。四川省省长张中伟会见了拉加拉姆，并与他就四川小麦的优质问题进行了讨论。拉加拉姆对四川小麦的优质问题提出了他的建议，张中伟省长非常同意他的看法，并在当年就为四川省农科院作物所拨出10万元专用经费，用以改善品种筛选设备。拉加拉姆在此前的1996年，还在四川受到了副省长刘昌杰的接见。

42. 1999 为了表彰中国与CIMMYT签订小麦穿梭育种合作协议10年来中国小麦专家所做出的突出贡献，CIMMYT向何中虎、黄钢、邹裕春等颁发了突出贡献荣誉证书。
43. 1999 四川省农业科学院作物研究所青年玉米育种家康继伟再次赴CIMMYT参加优质蛋白玉米培训。
44. 1999 经CIMMYT驻中国办事处主任何中虎博士推荐，四川省农科院耕作栽培中心主任郑家国研究员赴印度出席由CIMMYT和RWC举办的作物制度研讨会，开启了双方在作物栽培合作。
45. 2000 CIMMYT首任小麦部主任、世界著名小麦育种家、诺贝尔和平奖获得者勃劳格博士来四川省农科院访问。与勃劳格一道来院访问的还有美国、英国和我国农业部特别顾问温得夫博士和我国农业部科技司王连生。勃劳格博士在田间看了四川省农科院作物所育的小麦新品种及选系后，非常高兴，他高度赞扬四川省农科院与CIMMYT合作取得的巨大成绩，并在田间高兴地与在场的农科院、作物所的领导及作物所的全体小麦育种家合影留念。但勃劳格博士也十分严厉地批评了四川省农业厅和条状播种专家思想保守，对世界小麦育种新技术发展跟不上形势，还在使用单基因抗性。他建议四川应尽快采用微效多基因抗性育种。勃劳格博士到北京后，还专门为四川省小麦育种家在使用单基因抗性一事向农业部提出了意见和建议。
46. 2000 为表彰CIMMYT小麦部主任、首席小麦育种家拉加拉姆热心帮助四川小麦育种家在改进四川小麦育种及生产方面所作出的突出贡献，四川省政府授予拉加拉姆“金杯奖”。这是四川省政府授予在帮助四川经济建设中作出了突出贡献的外国专家的最高奖项。省政府在SAAS为拉加拉姆博士举行了颁奖典礼。拉加拉姆博士在典礼上发表了热情洋溢的讲话。
47. 2000 中国-CIMMYT小麦穿梭育种合作成都点负责人、我院作物所小麦育种家郭裕春赴CIMMYT参加CIMMYT举行的首届小麦高级培训班。
48. 2000 受CIMMYT资助，中国-CIMMYT小麦穿梭育种合作成都点负责人、作物所小麦育种家郭裕春出席了在匈牙利举行的世界级国际小麦研讨会议。
49. 2000 CIMMYT农艺学家、美国康奈尔大学教授P.R.Hobbs博士率南亚农艺专家访问四川，开展作物制度及相关技术交流，重点考察学习水稻旱育技术和小麦旱作培插穗覆盖栽培技术。
50. 2000 四川省农科院小麦农艺学家汤永禄随何中虎博士参加由CIMMYT和RWC在南亚举办的作物技术交流会。其间，汤永禄博士与会专家介绍了四川省农科院的有关技术研究与应用情况，印度和巴基斯坦的农业专家对水稻旱作培插穗覆盖栽培技术和“水稻旱育秧技术”表现出浓厚兴趣。
51. 2001 一个用CIMMYT种子育成的四川小麦新品种“川麦32”通过四川省审定。从20世纪中期开始，四川省连续出现小麦条锈病新生理小种，使生产上大面积推广的小麦品种全部重感条锈病，而且由于在过去的育种中育种家们过分集中使用繁多等抗源，因而新育出的品系也丧失抗性。由于川麦32引入了CIMMYT的新抗源，使川麦32在区试中一枝独秀，在连续两年区试的50多份参试品系中是唯一一个高抗条锈的高产新品种，在大面积上迅速推广，为全省小麦生产作出了重要贡献。2003年，“川麦32”经国家审定。
52. 2001 用CIMMYT种子育成的四川小麦新品种“川麦30”获四川省政府科技进步二等奖。由于川麦30具有矮秆抗倒、多穗大穗、白皮大粒等的高产特性，且矮秆早熟非常适合四川多熟制套作制以及能抗条锈病（条锈病）等特性，被列为四川省重点推广小麦新品种，在四川省科技厅及省农业厅组织的一系列农业技术生产中，连续2-3年在平原（成都、什邡、广汉）、浅丘（简阳、资中等）和深丘（宣汉、巴中、平昌等）以及攀枝花等地区河谷地带等不同生态区都创造了亩产450-540公斤的全省各种生态区高产纪录。2001年，川麦30累计推广面积达1774公顷，新增粮食9.72亿公斤，创造了重大经济效益和社会效益。
53. 2001 在P.R.Hobbs博士支持下，由CIMMYT出面为南亚诸国制作了技术光盘和电视台播放的专用录像带，将小麦旱作培插穗覆盖栽培技术和水稻旱作快繁殖技术引入南亚示范，效果良好，目前正在加大推广力度。
54. 2002 由中国农科院、CIMMYT及澳大利亚ACIAR联合召开的小麦种子技术研讨会在中国农科院举行。中国农科院植保所和全国小麦种子企业及病害专家育种家共50余人参加了研讨会。会上，CIMMYT小麦种子专家R.辛格（Ravi Singh）博士及澳大利亚国际著名小麦种子专家麦肯托教授（Prof.Bob McIntosh）做了小麦种子病效多基因持久抗性育种的专题报告。
55. 2002 小麦条锈病专家R.辛格博士在CIMMYT北京办事处何中虎博士陪同下，首次来四川省农科院作物所小麦种子育种合作项目的小麦种子病效多基因持久抗性育种专题，指导微效多基因持久抗性育种的田间选择方法。针对四川小麦种子病生理小种变化频繁的特点，勃劳格、拉加拉
姆、布格和斐肯托等国际著名小麦锈病专家及育种家都认为，微效多基因持久抗性将是解决四川小麦条锈病长期发展的最有效方法。但是，我国小麦条锈病专家们持不同意见，不少小麦育种家也认为这种方法在实际操作中不好掌握，费时，且农民和政府官员也不一定能接受。2000年，拉加拉姆·辛格与CIMMYT成都点小麦条锈育种合作项目商定，决定立即开始探索这一方法在四川应用的可能性。由四川提供5份丰产性和适应性较好且条锈抗性差的小麦品种或选系。由CIMMYT选择10份具微效多基因持久抗性且品质较好的CIMMYT品种或选系，在CIMMYT杂交育种F1、F2选择，F3或F4再选育成都鉴定、筛选。2002年第一轮50份条锈选系试验在成都万福堡开始。以后每年的4月下旬，条锈病充分扩展后，R.辛格均来成都田间一道选种。

56. 2002 用CIMMYT优质新选系Milan育成的四川第一个强筋优质小麦新品种‘川麦36’通过四川省审定。‘川麦36’的审定使四川小麦育种的品质改良有了新的突破。由于川麦36还高抗四川条锈病新生理小种Cyr30、Cyr31、Cyr32，被四川省农业厅确定为重点推广新品种。

57. 2002 CIMMYT小麦育种及生理专家、小麦部培训主任R.维拉瑞尔（R. Vilareal）博士由CIMMYT北京办事处何中虎博士陪同来作物所小麦条锈育种合作项目访问。曾在CIMMYT参加培训及合作研究的作物所小麦育种专家与维拉瑞尔进行了热情交流，介绍了各自在工作中取得的成绩，当维拉瑞尔看到CIMMYT四川学员能快速成长并在工作中取得巨大成绩时，他感到非常高兴。

58. 2002 汤永禄研究员赴CIMMYT接受农业制度高级技术培训，回国后开展小麦育种技术探索性研究，并大力宣传CIMMYT等国际研究机构倡导的保护性耕作技术，进一步强化了四川保护性耕作技术的研究与应用。

59. 2003 用CIMMYT人工合成种培育出的世界第一个普通小麦商用品种‘川麦42’通过四川省审定。‘川麦42’在四川表现出很高的高产潜力和适应性，而且高抗四川条锈病新生理小种。在三年省区试中，‘川麦42’创造了四川小麦省区试以来的最高亩产纪录（6.31t/ha）。2004年，‘川麦42’通过国家审定。在国家区试中，‘川麦42’也在长江上游组中名列前茅，也是长江上游麦区第一个区试每亩超过6t/ha的国家审定小麦品种。

60. 2004 CIMMYT亚大区集约农业项目（IAP）工作委员会在成都四川省农科院召开，近20位在南亚和西亚国家以及在亚热带工作的CIMMYT专家出席了会议。CIMMYT成都小麦条锈育种合作项目的专家和栽培专家在会上做了介绍，出席会议的CIMMYT专家还专程去成都郊区田间进行实地考察，与农民交谈。

61. 2004 ‘川麦30’获农业部丰收奖二等奖，以表彰川麦30获得的巨大的经济效益和育种专家与栽培专家紧密合作所创造的快速示范推广新方法。

62. 2005 用CIMMYT大穗选系ALD-88育成的又一个高产、大穗、大粒型小麦新品种‘川麦45’通过四川省审定。川麦45在两年的省区试中，千粒重高达50.4克。

63. 2006 世界银行副总裁、CGIAR主任Ian Johnson及CGIAR秘书长Francisco Reifschneider来四川省农科院作物所访问，听取了作物所参加CIMMYT小麦条锈育种合作项目全体小麦专家的合作进展汇报，并特别请大家看CIMMYT今后加强与国家及省的合作提出建议意见。Johnson主席及秘书长还专程去条锈育种试验基地田间仔细观看了试验材料，称赞我们工作做得很好。

64. 2006 用CIMMYT人工合成种培育出的世界第一个普通小麦商用品种‘川麦42’的四川省农科院作物所小麦育种家杨武云应邀出席了在澳大利亚举行的第十三届国际人工合成种小麦学术研讨会。会上，杨武云博士介绍了用CIMMYT人工合成种培育出的世界第一个普通小麦商用品种‘川麦42’的选育情况，受到与会科学家的高度赞赏。

65. 2007 CIMMYT农业经济学家J.德辛（John Dixon）及孟庆惠博士（Erika C.H.Meng）来川考察小麦条锈育种合作项目。两位专家详细了解了条锈育种中，用人工合成种育成的小麦新品种川麦42在农民生产中的经济收益，以及新品种示范、推广方法与经济效益等。他们除在广汉专家大院及郫县、温江、邛崃的试验基地进行考察和与农户座谈外，还专程去丘陵麦区的中江县农村与农户座谈，爬上山顶去观看小麦受旱的情况。他们最后还提出希望能与我们的小麦育种家、农学家一道，进行‘三位一体’的全面合作研究。John计划在2004年出CIMMYT的成都办事处会时能讨论具体方案。
Annals of Major Events of the Scientific Collaboration between SAAS and CIMMYT

1, 1966 The CIMMYT released wheat variety 'Penname 62' was introduced into Sichuan province. This was the first time for wheat breeders and farmers in Sichuan to know and see the 'Mexican wheat'.

2, 1967-83 About 20 wheat varieties released from CIMMYT were introduced into Sichuan during 1967-83, but after several years planting and screening in the field, no any variety could be used as commercial variety in Sichuan since their lower yielding and poor adaptation to compare the new released Sichuan varieties 'Fan 6' and 'Mianyang 11' under Sichuan agro-ecological environments.

3, 1984 A wheat breeder, Mr. Zou Yuchun, in Sichuan Academy of Agricultural Sciences (SAAS) visited to CIMMYT from USA together with Prof. W. Kronstad in Oregon State University (OSU), USA. This was the first time of the wheat breeder in Sichuan to visit CIMMYT. This two-week's visiting gave Mr. Zou so deep impression, it was the first time for him to see such a huge scale of research experiments and so many excellent scientists working together in a research institution. During this visiting he also got an opportunity to meet Dr. Curtis, Dr. Klatt and Dr. Rajaram, the Director, Associate Director and the breeder of Wheat Program in CIMMYT, and gave them a brief introduction of the wheat breeding and wheat production in Sichuan. Finished the studies in OSU Mr. Zou came back to Sichuan and started to introduce 3-5 International nurseries from CIMMYT every year for screening and to see the performance of CIMMYT materials under Sichuan environments.

4, 1984 Headed by Associate Director Dr. Klatt, a CIMMYT scientists delegation visited to Sichuan Academy of Agricultural Sciences (SAAS). This was the first time for CIMMYT wheat scientists to visit Sichuan. This visiting gave them a very deep impression and they were so interesting to the wheat breeding and production in Sichuan when they finished this visiting Dr. Klatt told Mr. Zou on phonecall.

5, 1985 CIMMYT wheat scientist Dr. Bekele visited to SAAS. This was the first wheat breeder sent by wheat program in CIMMYT after the associate director Dr. Klatt visiting.

6, 1985 Invited by CIMMYT, wheat breeder in Crop Research Institute (CRI) of SAAS Mr. Ruo Shida went to CIMMYT to join a short research program on wheat scab in CIMMYT wheat program. This was the first time for a wheat breeder from CRI in SAAS to join a short research program in wheat program in CIMMYT.

7, 1985 Invited and supported by CIMMYT, Prof. Yu Yao, wheat agronomist and the director of CRI of SAAS, and wheat breeders in CRI of SAAS Ms. Song Hexian and Mr. Zou Yuchun visited CIMMYT. This was the first wheat scientists delegation from SAAS to visit CIMMYT. This visiting gave them a very good opportunity to go and see different programs, labs and nurseries in experiment field, and get a better understand of CIMMYT through working, discussing and exchanging ideas together with CIMMYT leaders and scientists. During this visiting they also experienced the biggest earthquake in Mexico city.

8, 1986 CIMMYT wheat scientist Dr. H. Dubin and barley breeder H. Vivar visited to SAAS.

9, 1987 CIMMYT wheat breeder Dr. W. Pfeiffer, wheat pathologist Dr. Towes and the director of wheat quality lab in CIMMYT Dr. Amaya visited to SAAS.

10, 1987 Wheat breeder in CRI of SAAS Mr. Zou Yuchun received the proposed document of the agreement of a wheat shuttle breeding program between China and CIMMYT prepared and signed by Dr. Klatt, the Associate Director of CIMMYT Wheat Program. In this agreement they suggested that three academies, the Jiangsu Academy of Agricultural Sciences in Nanjing, SAAS in Chengdu and Heilongjiang Academy of Agricultural Sciences in Haerbing would be the three shuttle sites in China side.

11, 1988 Wheat scientists Dr. Bekele and Dr. Fuentes visited SAAS from CIMMYT.

12, 1988 At the end of year 1988 the agreement of the collaborative wheat shuttle breeding program between Chinese Academy of Agricultural Sciences (CAAS) and CIMMYT was signed in CIMMYT. In this agreement SAAS was confirmed as one of the three spring wheat shuttle sites in China and Mr. Zou Yuchun was appointed as the wheat breeder in charge of the shuttle breeding work in SAAS, Chengdu.

13, 1988 Young maize breeder Mr. Zhang Biao in CRI of SAAS went to CIMMYT for training course on maize breeding.

14, 1989 Presided by Prof. Zhuang Qiaosheng, the first workshop of the collaborative wheat shuttle breeding program between CAAS and CIMMYT was held in Beijing. Wheat agronomist and the Director of CRI in SAAS Prof. Yu Yao and wheat breeder Mr. Zou attended this meeting. Headed by the Director of CIMMYT Wheat Program Dr. T. Fischer, CIMMYT wheat scientists Dr. H. Brown and Dr. M. Kohli attended this workshop.

15, 1989 Headed by the Director of CIMMYT Wheat Program Dr. T. Fischer, CIMMYT wheat scientists Dr. H. Brown and Dr. M. Kohli visited to SAAS. This was the first CIMMYT wheat scientists delegation visited SAAS after the signed of the collaborative wheat shuttle breeding program in CIMMYT in 1988. On behalf of the Sichuan provincial government, the Vice Secretary General of Sichuan Provincial Government and the President of SAAS Prof. You Shulin met and gave a banquet to CIMMYT guests.
16, 1989  CAAS sent the first Chinese wheat scientists delegation to CIMMYT to implement the collaborative wheat shuttle breeding program. Head of Chengdu shuttle site, Mr. Zou Yuchun was one of the delegation members. Signed by Dr. T. Fischer and Dr. S. Rajaram, the CIMMYT Wheat Program awarded a special diploma to each of the Chinese scientists to confirm and honor their hard working and good contributions during working in CIMMYT. Mr. Zou also went to CIMMYT in year 2001, 2002 and 2005 for this shuttle breeding program after 1989.

17, 1989  Young wheat breeder Mr. Li Yuejian in CRI was sent to CIMMYT to join the wheat training course. This was the first young wheat breeder from CRI in SAAS to go to CIMMYT for training course after the signed of the collaborative wheat shuttle breeding program. Finished the training course Mr. Li Yuejian came back to CRI to continue his breeding research and ministration work and got his doctorate. In 2000 he released a very good wheat new variety Chuanmai 107 both in Sichuan and national level. This Chuanmai 107 was awarded the second prize of National Prize of Science & Technology Improvement in 2006. Now Dr. Li Yuejian is the President of SAAS and the academic pioneer in Sichuan province.

18, 1989  Barley variety V24, a variety directly screening from CIMMYT International Barley Nursery, was released in Sichuan. This was the only variety we screening directly from introduced CIMMYT wheat, durum, barley and triticale varieties/lines. V24 showed very high yielding potential and good adaptation in many provinces along the Yangtze river. V24 was awarded the Third Prize of the Provincial Science & Technology Improvement in 1992. Another two barley varieties released in Sichuan the Chuanadami 1 and Chuanadami 2 were also derived from V24.

19, 1989  The USA published scientific book 'Genetic Improvement in Yield of Wheat' was translated and published in Sichuan by wheat scientists in CRI to introduce wheat breeding research in CIMMYT.

20, 1991  Mr. Zou Yuchun went to CIMMYT for the second time to carry out the collaborative wheat shuttle breeding program. According to the quality data found from CIMMYT wheat quality lab, 'Milan' was selected and taken back to Sichuan at this shuttle activity by Mr. Zou. 'Milan is the best line among the thousands of wheat varieties/lines we selected from CIMMYT during the shuttle program. It not only provides us the high processing quality, it also offers us the good and different stripe rust resistance genes in Sichuan. The first strong gluten wheat new varieties released in Sichuan, Chuanmai 36 and Chuanmai 39, were both derived from Milan and another 3 new released wheat varieties in Sichuan were also derived from Milan.

21, 1992  Young wheat agronomist in CRI Mr. Huang Gang was sent to CIMMYT to attend the wheat training course. Mr. Huang had also another chance to go to CIMMYT for training on wheat cultivation in 1997. Dr. Huang Gang got his doctorate after the training and now he is the Vice President of SAAS and the academic pioneer in Sichuan.

22, 1992  Young wheat breeder in CRI Mr. Zhu Huazhong went to CIMMYT to join a short cooperative study on wheat quality. He also had the chance to go to CIMMYT again in 2002 to attend the advanced wheat training course and in 2006 for short study on stripe rust research. Dr. Zhu also got his doctorate after the training and now he is the director of wheat program in CRI.

23, 1992  Dr. S. Rajaram, the Director of CIMMYT Wheat Program, visited SAAS to exchange ideas and give advices on collaborative wheat shuttle breeding program at Sichuan site. Dr. Rajaram also came to SAAS in 1994, 1996, 1999 and 2000 for inspecting to the collaborative wheat shuttle breeding program.

24, 1992  Mr. Zou Yuchun, Head of the collaborative wheat shuttle breeding program at Chengdu site, to go to CIMMYT the third time for shuttle program. At this time Mr. Zou also discussed with Dr. Rajaram on details of the publication of the book in Chinese in China to introduce CIMMYT wheat program for their working philosophy, breeding methods, nurseries, yield books and records making in field and in labs, and breeding materials and released varieties. Dr. Rajaram hoped that through this book wheat scientists, particularly the young breeders in China could have a better understand of CIMMYT wheat program and therefore help them to do good job when they are working with CIMMYT.

25, 1994  The first CIMMYT germplasm derived wheat variety Chuanmai 25 was released in Sichuan. Chuanmai 25 was crossed based on CIMMYT variety Genaro 80 and performed very well in hilly areas in Sichuan.

26, 1994  While Dr. Rajaram visited to SAAS the second time, the book 'Wheat Breeding in CIMMYT' was published in Sichuan in Chinese. This book gave more details on wheat breeding in CIMMYT and helped wheat scientists with in particular the young wheat breeders to understand how the CIMMYT scientists doing their breeding work for the world poor people. This book was sent to CIMMYT for the trainees from China, and was sent to libraries in all agricultural universities/colleges in China to help the young wheat scientists.
27, 1995  Dr. Yang Wuyun, a young wheat breeder in CRI was sent to CIMMYT to attend the training course. During the training Dr. Yang found and was very interesting in the synthetic wheat developed in CIMMYT by Dr. A. Mujeeb-Kazi. He took some lines of this synthetics and backed to CRI after he finished the training course. Dr. Yang used these synthetic lines to cross with a Sichuan wheat new variety Chuanmai 30 derived from CIMMYT ALD's and thus a new commercial bread wheat variety Chuanmai 42 was developed from these crosses. Chuanmai 42 was released in Sicuan in 2003 and was released in national level in 2004. This is the first common wheat variety derived from the synthetic wheat in the world. Now Dr. Yang is the Associate Director of CRI in SAAS and is the leading scientist in Sichuan province.

28, 1995  Mr. Zou Yuchun in CRI went to CIMMYT the forth time to conducted the collaborative wheat shuttle breeding program.

29, 1996  Dr Rajaram visited SAAS the third time for shuttle breeding program. He attended a field day of the high yielding new wheat line SW3243 in Shifang county. The Vice-Governor of Sichuan Province Mr. Liu Changjie and some other top officials of Sichuan government met and gave a banquet to honor Dr. Rajaram during his visiting.

30, 1996  Supported by CIMMYT, Mr. Zou Yuchun attended the 5th IWC in Ankara, Turkey. On this conference Mr. Zou reported some progress achieved from the collaborative wheat shuttle breeding program between Sichuan and CIMMYT. Participants particularly from the Middle Asia were very interested in this cooperation and hoped that CIMMYT could do the same collaborative program with them.

31, 1996  Mr.Zou Yuchun was awarded the national honor diploma by Ministries of Planning, Science & Technology, Agriculture and Administration of Foreign Experts Affairs for recognizing the great contribution made by Mr. Zou in the international collaboration on agriculture.

32, 1996  Young maize breeder Mr. Kang Jiwei from CRI of SAAS went to CIMMYT for training course on maize breeding.

33, 1997  The set up of CIMMYT Beijing Office in Beijing was greatly strengthening the relationship between China and CIMMYT and thus got more close collaboration on wheat shuttle breeding program with Sichuan. Mr. Huang Gang went to CIMMYT again this year to attend the training course on wheat agronomy.

34, 1998  The former director of CIMMYT wheat program Dr. T. Fischer visited SAAS again with CIMMYT Liaison Officer in Beijing Dr. He Zhonghu. Dr. Fischer inspected the progress of wheat shuttle breeding program in Sichuan and discussed with wheat scientists in SAAS on the proposal of a possible cooperative project on wheat improvement in Sichuan by ACIAR, Australia.

35, 1998  Barley breeder from CIMMYT Dr. H. Vivar visited SAAS again to discuss the development of naked barley in Sichuan for feeding.

36, 1998  Young wheat breeder Ms. Wu Ling was sent to CIMMYT to attend the training course on wheat biotechnologies.

37, 1998  CIMMYT Liaison Officer in Beijing Dr. He Zhonghu visited SAAS to inspect the CIMMYT germplasm derived high yielding new wheat line SW3243 on farmers field in Xuanhan county.

38, 1998  The second CIMMYT germplasm derived wheat variety Chuanmai 30 (SW3243) was released in Sichuan. Chuanmai 30 is high yielding with short strew (80 cm) and very good resistance, big spike with good fertility and large and white kernel, so farmers like it very much. In addition, Chuanmai 30 is early maturate with short strew so is very good for intercropping and multi-cropping in hilly rainfed area. A lot of demonstration work had been conducted before and after released by different level of government and wheat agriculturists in Sichuan so the growing area was expanded very fast. To year 2001, the total growing area of Chuanmai 30 was reached to 1.77 million hectares. Chuanmai 30 is also a very good parent for breeding. The first synthetic derived bread wheat variety Chuanmai 42 was cross based on Chuanmai 30 and another bread wheat line Chuan 6415. Another very high yielding wheat varieties (more than 10% higher than CK) released in 2006 in Sichuan the Chuanyu 20 was also based on Chuanmai 30.

39, 1998  In July 1998, Dr. Shiviji Pandey, Dr. Surinder Vasal and other members of the CIMMYT project advisory committee arrived in Chengdu to make survey of our QPM breeding program and variety trials, and in October 1998, Dr. Surinder Vasal came again to our Institute for QPM work plan.

40, 1999  The Vice Governor of Sichuan Province Mr. Yang Chonghui headed a scientific delegation of Sichuan province to visit to CIMMYT and the Vice president of SAAS Dr. Tan Hepin was in this delegation.

41, 1999  Dr. Rajaram visited SAAS again for the forth time to inspect the collaborative wheat shuttle breeding program. He was interviewed by the Governor of Sichuan Province, Mr. Zhang Zhongwei during this visiting. In this interview Dr. Rajaram suggested the Sichuan provincial government to give more the Vice Governor of Sichuan Province Mr. Liu Changjie when Dr. Rajaram visited Sichuan in 1996.
attention to the wheat quality while the marketing economic developing fast in China. Few months later Governor Zhang supported some funds to CRI to improve facilities in quality lab. Dr. Rajaram also met

42, 1999

In recognition of great contributions in facilitating and executing the Wheat Shuttle Breeding Program between CIMMYT and China from 1980-1999, Director General Prof. T. Reeves and Director of CIMMYT Wheat Program Dr. S. Rajaram presented a certificate to Prof. Zou Yuchun, the head of he Wheat Shuttle Breeding Program, Chengdu site. Director of CRI in SAAS Dr. Huang Gang received the same certificate at the same time.

43, 1999

Young maize breeder Mr. Kang Jiwei in CRI of SAAS went to CIMMYT again for training on quality protein maize (QPM) breeding.

44, 1999

Rice agronomist Mr. Zheng Jiaqiu, the Director of the Tillage & Cultivation Centre of SAAS, went to India for Cropping System Workshop held by CIMMYT and RWC and started the cooperation in cropping system between SAAS and CIMMYT.

45, 2000

The first Director of Wheat Program in CIMMYT, the famous wheat breeder over the world and the owner of Nobel Peace Prize Dr. N. Borlaug visited to SAAS. With very high spirit and enthusiasm Dr. Borlaug went to experimental fields and saw the breeding new lines while asked questions and discussed to wheat scientists and leaders in CRI and SAAS. He was so exciting when he saw the released CIMMYT derived variety Chuanmai 30 and the advanced lines SW8188 (released name Chuanmai 32) and SW8688 (released name Chuanmai 36). He said he felt very proud for the shuttle breeding program and seeing the fast growing up of Chinese wheat breeders in SAAS.

46, 2000

Director of CIMMYT Wheat Program Dr. S. Rajaram was awarded the 'Golden Summit Prize' by Sichuan Provincial Government. This is the highest prize from Sichuan Provincial Government to recognize the great contributions made by foreign exports who is working in Sichuan to help the economic development. A awarding ceremony was held in SAAS and Dr. Rajaram gave a enthusiasm speech on this ceremony.

47, 2000

Head of he Wheat Shuttle Breeding Program, Chengdu site, Prof. Zou Yuchun, went to CIMMYT to attend the First Advanced Training Course given by CIMMYT Wheat Program. During the one-month course Prof. Zou had the opportunity to meet most of scientists working in wheat program and discuss with them, and he also had chance to go round the countryside near Toluca.

48, 2000

Supported by CIMMYT Prof. Zou Yuchun attended the 6th IWC in Budapest, Hungary.

49, 2000

Dr. P.R. Hobbs, the CIMMYT agronomist and the professor of Cornell University, and some members of Rice-Wheat Consortium visited Sichuan and made survey of cropping system in Sichuan and learned the technique of 'dry-seedbed rice seedlings' and 'precision surface seeding and mulching rice straw for wheat after rice'.

50, 2000

The agronomist Mr. Tang Yonglu in CRI of SAAS went to India and Pakistan with Dr He Zhonghu, the Liaison Officer in Beijing, for attending a cropping system workshop. During the visiting Mr. Tang Yonglu introduced the cropping system in Sichuan and the scientists attended the meeting were very interested in some new technologies.

51, 2001

The third CIMMYT germplasm derived wheat new variety Chuanmai 32 (SW8188) was released in Sichuan. Started from the middle 90s, stripe rust new races changed so fast and almost all wheat varieties in commercial production in Sichuan were susceptible these new races, even most of the new developed wheat lines in provincial yield trials also could not escape, with the only except of the CIMMYT germplasm derived new line SW8188. This was just maybe because CIMMYT germplasm offered SW8188 some new resistant genes different from the most Sichuan old varieties or parental lines. In this case, Chuanmai 32 was passed the provincial yield trial quickly and was planted in big scale on commercial production. Chuanmai 32 was released on national level in 2003.

52, 2001

The second CIMMYT germplasm derived wheat variety Chuanmai 30 (SW3243) was awarded the second prize of Provincial Science & Technology Improvement Prize to recognize the great contribution of increasing wheat production and the farmers' income in Sichuan.

53, 2001

Funded by CIMMYT, SAAS made discs and TV tapes for South Asia countries on the technique of dry-seedbed rice seedlings and the technique of precision surface seeding and mulching rice straw for wheat after rice. These new technologies are doing very well in these areas and more extension work are being conducted.

54, 2002

Together with CAAS and ACIAR, CIMMYT held the National Stripe Rust Conference of China in Chengdu. Famous stripe rust pathologists Prof. Bob McIntosh, Dr. Ravi Singh and Prof. Wu Liren were attended this conference and gave very good lectures, particularly the multi-minor-genes durable resistance was very interesting to 50 participants from rust epidemic provinces in China. CIMMYT Liaison Officer in Beijing Dr. He Zhonghu attended and held this conference.
Accompanied by Dr. He Zhonghu, the CIMMYT Liaison Officer in Beijing, CIMMYT wheat pathologist Dr. Ravi Singh visited SAAS and worked in experimental field together with wheat breeders in shuttle breeding program in Chengdu. In field, Ravi explained the methods of durable resistance to breeders and showed them how to identify the major-gene resistance and the multi-minor-genes resistance and how to select the possible resistant single plants. Started from middle 90s, new races of stripe rust changed very fast and the epidemic of yellow rust in Sichuan and connected provinces like Gansu, Shanxi and Yunnan was very severe. Dr. Borlaug, Prof. McIntosh, Dr. Rajaram and Dr. Singh were all suggested that Sichuan should do more breeding on multi-minor-genes durable resistance. But lot of pathologists and some wheat breeders in China and also in Sichuan province didn't believe the multi-minor-genes durable resistance could work well in Sichuan situation. So started from 2000, Dr. Rajaram, Dr. Singh and Prof. Zou Yuchun decided to carry out a special shuttle program on durable resistance in Sichuan to see if this method works or not under Sichuan yellow rust environments. 5 varieties/lines with good agronomy traits except susceptible to yellow rust were sent to CIMMYT and then in CIMMYT 10 multi-minor-genes resistance lines with good processing quality and other agronomy traits would be chosen and crossed to Sichuan lines. The progeny of the 50 crosses would be planted and screened in both environments with shuttle methods. Each year in middle-late April, Ravi would come to Chengdu for selecting together with wheat breeders in CRI. In 2007 about 200 durable resistance lines were planted in yield trial and checked the resistance by pathologists in Sichuan.

The first strong gluten new wheat variety derived from CIMMYT germplasm Milan the Chuanmai 36 (released in 2002) and Chuanmai 39 (released in 2003) were released in Sichuan province. This was the first time in Sichuan we could grow our own strong gluten wheat variety and the quality data could pass through the national standards. This is a big broken through in quality improvement in Sichuan. Chuanmai 36 and Chuanmai 39 are also very good resistance to stripe rust new races CYR 30, CYR 31 and CYR 32. This is a particularly important character for wheat variety growing in Sichuan. Chuanmai 39 was released in national level in 2004. In 2003, there were another two new varieties derived from Milan and released in Sichuan, Chuanyu 18 and Chuanyu 19, both were developed by breeders in Chengdu Bio-research Institute, the Chinese Academy of Sciences.

CIMMYT wheat breeder and the Director of Wheat Training Office Dr. R. Villareal visited SAAS accompanied with Dr. He Zhonghu. All CIMMYT trainees from SAAS met Dr. R. Villareal. Dr. R. Villareal was so glad when he saw the rapid growing up of the young trainees in Sichuan.

Mr. Tang Yonglu, agronomist in SAAS went to CIMMYT for attending the training course on the bed-planting and the technology of resource conservation agriculture. After coming back to SAAS, Mr. Tang started to do some research on bed-planting under rice wheat rotation system, and he conducted more experiments on resource conservation agriculture in Sichuan environments.

Chuanmai 42, the first common wheat variety derived from CIMMYT synthetics, was released in Sichuan. This is the first time for wheat scientists in the world to release the common wheat variety derived from synthetics. Chuanmai 42 also had very high yielding potential, good adaptation and resistance to yellow rust new races during in provincial yield trial and the national yield trial. Chuanmai 42 created the highest yield new records (6.13t/ha ) during 3 years provincial yield trial and was the first highest yielding line over 6/ha in National Yield Trial of up part Yangtze region.

CIMMYT IAP working meeting was held in SAAS, about 20 CIMMYT scientists working in Southern Asia, West Asia and CIMMYT Headquarter attended this meeting. SAAS wheat breeder and agronomist gave report on the progress of wheat shuttle breeding program on this meeting. The IAP scientists also had chances to go round countryside and talk to farmers near Chengdu, SAAS experimental stations and taste the Sichuan food in Chengdu.

Chuanmai 30 achieved the second prize of the Bumper Harvest Prize set by MOA of China, to recognize the great economic and scientific contributions in agriculture.

The CIMMYT germplasm ALD 's' derived another wheat new variety Chuanmai 45 was released in Sichuan. Chuanmai 45 is middle in height and lodging resistance, and has very big spike with big kernels (1000 kernel weight was over 50g in provincial yield trial).

The Vice-Chief Head of World Bank and the President of CGIAR, Mr. Ian Johnson visited SAAS with the Secretary General of CGIAR Mr. Francisco Reifsneider to inspect the cooperative wheat shuttle breeding program in Chengdu. They visited the labs, experimental stations, saw the newly developed lines in field, and had a discussion with all scientists working with CIMMYT in the shuttle breeding program and asked for suggestions for the development of CIMMYT in the future. Mr. Johnson was very exciting when he saw Chuanmai 42 in the field and knew it is the first common bread wheat developed from CIMMYT synthetics over the world.
Dr. Yang Wuyun, the breeder of the first common wheat variety derived from CIMMYT synthetics, attended the 1st International Symposium of Synthetic Wheat in Australia. On this Symposium Dr Yang presented a paper talking about the development of Chuanmai 42, the first common wheat variety derived from CIMMYT synthetics. Scientists were very interesting in his excellent work.

CIMMYT agro-economists Dr. John Dixon and Dr. Erika C.H. Meng visited SAAS. They were especially interesting in the real benefits of the farmers when they grow synthetic derived new wheat variety Chuanmai 42. They were also very interested in how the wheat breeders worked with wheat agronomists in doing demonstration and the extension work in countryside after a new variety released. They went to experimental stations, on farmer experiments, and a hilly village in Zhongjiang county. They discussed to breeders and agronomists and talked to farmers in their house and in field. At last they made a proposal and hoped that Sichuan wheat breeders, agronomists and CIMMYT agro-economists could work together as 'three in one' to get more efficient on doing demonstration and extension.