# Autarky and Lebensraum. The political agenda of academic plant breeding in Nazi Germany[1]

*By Thomas Wieland* *

## Introduction

In a 1937 booklet entitled Die politischen Aufgaben der deutschen Pflanzenzüchtung (The Political Objectives of German Plant Breeding), academic plant breeder and director of the Kaiser Wilhelm Institute (hereafter KWI) for Breeding Research in Müncheberg near Berlin Wilhelm Rudorf declared: "The task is to breed new crop varieties which guarantee the supply of food and the most important raw materials, fibers, oil, cellulose and so forth from German soils and within German climate regions. Moreover, plant breeding has the particular task of creating and improving crops that allow for a denser population of the whole Nordostraum and Ostraum [i.e., northeastern and eastern territories] as well as other border regions…"[2]

This quote illustrates two important elements of National Socialist ideology: the concept of agricultural autarky and the concept of Lebensraum. The quest for agricultural autarky was a response to the hunger catastrophe of World War I that painfully demonstrated Germany's dependence on agricultural imports and was considered to have significantly contributed to the German defeat in 1918. As Herbert Backe (1896–1947), who became state secretary in 1933 and shortly after de facto head of the German Ministry for Food and Agriculture, put it: "World War 1914–18 was not lost at the front-line but at home because the foodstuff industry of the Second Reich [i.e., the German Empire] had failed."[3] The Nazi regime accordingly wanted to make sure that such a catastrophe would not reoccur in a next war. In addition, reducing agricultural imports should help towards saving foreign currency that was needed for the purchase of military equipment.

The concept of Lebensraum implied the military expansion of Germany towards Eastern Europe that should become the new living space for a genetically improved German master race, whereas the native population was planned to be enslaved, deported, and killed. The vision of Lebensraum was that of a vast, self-sufficient territory based on an autarkic

agricultural economy. Hence, the concepts of autarky and Lebensraum were tightly linked together. This linkage is also obvious in another quote from Rudorf's booklet claiming that the German territory was far too small for the feeding of its population.

Rudorf's public support for Nazi policies might not be surprising. As director of the internationally renowned KWI for Breeding Research, he held a highly visible position in the German agricultural research system. Moreover, Rudorf owed his career to the intervention of the Nazi regime that forced the Kaiser Wilhelm Society in 1936 to appoint him director of the institute despite the vote of an expert committee doubting his qualification for the position.[4] Yet, his statement was more than lip service. As we will see in the following, the majority of German academic plant breeders was quite willing to support and implement Nazi policies: academic breeders focused their research on crops that should help towards the closing of the so-called "protein, oil and fiber gap" and the appropriation of Eastern Europe, they established new research institutes to further these objectives, and some of them even collaborated with Hitler's infamous Schutzstaffel, the SS, and the Auschwitz concentration camp.

How can we understand the positive response of academic plant breeders to the Nazi policies of autarky and Lebensraum? My answer draws on an analytical framework proposed by Mitchell G. Ash in 2002.[5] Borrowing from science and technology studies (STS), Ash argues that the relationship between science and politics can best be studied in terms of a mutual exchange of resources which can be financial, cognitive, personal, institutional, rhetoric etc etc. Accordingly, the evolution of the science-politics relationship—and in particular the continuities and discontinuities in the development of science—can be understood as subsequent reconfigurations of "resource ensembles." Informed by this framework, I will argue that while the Nazis' assumption of power brought about some significant changes in the concrete mechanisms and the intensity of resource exchange between the realms of academic plant breeding and politics, the basic patterns of this exchange had already been in place before. As a consequence, it is only by taking the early history of academic plant breeding into account that we can fully comprehend the reasons for the striking willingness of the scientific community to work for the National Socialist sate. As we will see, agricultural self-sufficiency and expansionism or colonialism, respectively, had been on the political agenda of German academic plant breeders long before the Nazis came into power.

## Academic plant breeding before 1933

In Germany, the systematic breeding of field crops can be traced back to the middle of the 19th century when market gardeners, beet sugar manufacturers and progressive farmers—most of them based in the Prussian province of Saxony and its adjoining regions—sought to increase yields by the hereditary improvement of sugar beet, potatoes, and cereals. Within a short period of time, a prosperous seed industry came into being that soon sold its products to farmers all over Germany and in many other European countries. Yet it was not before the late 19th century that plant breeding entered academia.[6]

The first series of lectures exclusively devoted to the subject was held at Göttingen University in 1889 by Privatdozent Kurt von Rümker (1859–1940), who worked hard to establish plant breeding as an academic discipline. Thanks to his efforts the breeding of field crops had become a subject of research and teaching at several German universities by the eve of the First World War. Its disciplinary status remained nevertheless uncertain. As a matter of fact, plant breeding stood in the shadow of more traditional agricultural disciplines, above all crop production. Furthermore, academic plant breeders—like other agricultural scientists in Germany—suffered from a low reputation among the largely urban professoriate.[7]

In order to further improve the status of their discipline and to gain material and symbolic support from the state, academic plant breeders were keen to relate their subject to issues beyond the economic interests of farmers and the seed industry. An early issue of concern was the promotion of agricultural development on a regional level that led to the establishment of state-owned breeding institutes in Bavaria, Württemberg, and Baden shortly after the turn of the century. When, under Kaiser Wilhelm II, German nationalism rose to unknown heights and finally erupted into World War I academic plant breeders were able to establish a much broader framework for their scientific activities. Indeed, they presented plant breeding as a way to secure the national interests of the German Empire. Ludwig Kühle, chairman of the Society for the Promotion of German Plant Breeding, announced: "To further plant breeding means to increase the Empire's instruments of power."[8] Consequently, the major political issues taken up by academic plant breeders in late imperial Germany were colonialism and agricultural self-sufficiency.

Germany's transformation into a colonial empire played an important role in the nation's self-perception as a rising military power. In addition to their symbolic importance, the German colonies were considered territories for agricultural exploitation by the motherland.

The initial focus of agronomists and state officials was not on plant breeding but the transfer of new crops to the colonies in order to broaden the spectrum of agricultural production.[9] Because academic plant breeders were relatively late to discover colonial agriculture as an opportunity to develop their discipline, they were all the more eager to promote plant breeding as a means for the implementation of national policies when they entered the field.

For instance, Theodor Roemer (1883–1951), who went in the early 1910s on behalf of the German Colonial Office to East Africa for the establishment of a cotton breeding station, argued after his return that plant breeding has to be considered the most effective tool among the technologies for the development of colonial agriculture.[10] About the same time, academic plant breeder Carl Fruwirth (1862–1930) also thought it was time "to talk on the objectives of plant breeding in the colonies."[11] Fruwirth chose the 1914 meeting of the renowned German Agricultural Society for his talk, ensuring thus a wide audience. Two years before, he had already devoted the fifth volume of his famous handbook of plant breeding to the improvement of colonial crops. In so doing, Fruwirth established a highly visible link between his discipline and the nation's political ambitions.

Germany's colonial history ended with its defeat in World War I. As a consequence, colonial plant breeding lost a great deal of its political and scientific significance. The general idea to appropriate foreign territories by the breeding of new crop plants did not vanish, however. As we will see, the idea experienced a strong revival in the context of Nazi expansionism although its main geographical focus was not Africa but Eastern Europe.

The second major issue of national interest taken up by academic plant breeders even before World War I was Germany's strong dependence on agricultural imports. In 1912, Kurt von Rümker—by then a full professor at Berlin Agricultural College—warned that agricultural dependence would make the nation highly vulnerable in a possible war with its neighbors. Of course, he did not forget to advertise plant breeding that would rank "among the most effective tools" for securing the feeding of the German population from domestic production.[12] Rümker's colleague Theodor Remy (1868–1946) of Bonn-Poppelsdorf Agricultural College argued in a similar way claiming that agricultural self-sufficiency was a "national goal" of plant breeding.[13]

How much Germany actually depended on foreign agricultural products became obvious during the First World War when the British imposed an economic blockade that cut Germany off from important supplies of food and raw materials. The blockade led to a severe food shortage. The situation worsened due to some other factors such as a bad harvest of

potatoes in 1916. As a consequence, large parts of the German population suffered hunger—an experience that powerfully shaped the nation's collective memory. The "hunger catastrophe" of World War I provided academic plant breeders with a strong argument in their attempt to mobilize symbolic and material resources for their discipline. This is particularly evident in the various efforts of the noted geneticist and plant breeder Erwin Baur (1875–1933).

In 1917, Baur co-authored a memorandum for a plant breeding institute to be established under the umbrella of the Kaiser Wilhelm Society, Germany's outstanding organization for the advancement of science. The goal of the proposed institute was to help Germany towards agricultural self-sufficiency by applying modern genetics to plant breeding. The memorandum argued that this new approach allowed for a substantial increase in agricultural productivity and for the creation of novel crops. It also considered the foundation of subsidiary institutes in the German colonies in order to promote colonial agriculture in line with the aims and objectives of the motherland.[14]

Due to financial problems, the Kaiser Wilhelm Institute for Breeding Research was only established in 1928. Yet, its political agenda had not changed in the meantime. On the contrary: Baur who became the first director of the institute had developed into an ardent advocate of autarky. He used every opportunity to deplore Germany's dependence on imports and to present plant breeding as a powerful means to overcome it. Baur could provide some evidence for his claims. In 1930, he announced the successful breeding of a novel crop. The so-called "sweet lupin" became the emblem of modern plant breeding in interwar Germany. Since the sweet lupin was rich in proteins and could be cultivated on the sandy soils of East Germany it seemed to be an ideal fodder plant. According to Baur, the novel crop would allow without any problems for the domestic production of all the protein needed for the feeding of the German people.[15] Although this was never realized, in the public perception the sweet lupin proved the omnipotence of modern plant breeding. Furthermore, the problem of autarky now seemed to be a technical rather than a political problem, solvable by the application of modern genetics. It is therefore not surprising that the National Socialist state showed great interest in the sweet lupin that was also called the political lupin.[16]

To summarize: when the Nazis came into power in 1933, expansionism and autarky had already been on the political agenda of academic plant breeders for quite some time. Moreover, academic plant breeders had started to translate this agenda into research programs. This holds especially true for the quest for autarky; the sweet lupin is but one example.

## A boost for academic plant breeding

From the very beginning, National Socialist policy aimed at the preparation of domestic agriculture for a future war.[17] Accordingly, agriculture was one of the first sectors subjected to Gleichschaltung (i.e., forced alignment). The development reached its first climax in September 1933 when all people involved in the production and distribution of agricultural products had to join the Reichsnährstand organization. About one year later, the German Minister for Food and Agriculture Richard Walther Darré (1895–1953), who headed the new organization, proclaimed a national food campaign, the so-called Erzeugungsschlacht. Its aim was twofold: (1) maximizing agricultural productivity and (2) shifting agricultural production from surplus commodities to scarce commodities. More specifically, the goals were to increase yield performance, to cultivate crops which allowed livestock farming on a domestic fodder basis, and to provide oils, fats, and fibers for the foodstuff and textile industries.

In order to coordinate the work of German agricultural scientists and to direct their research towards policy goals, in 1934–35, a group of scientists and Nazi officials established the Forschungsdienst (i.e., research service) that comprised all agricultural scientists from universities and research institutes across the country. The prime mover behind this establishment was the consultant of the Prussian Ministry for Education Konrad Meyer (1901–1973), who became chairman of the Forschungsdienst. An agricultural scientist himself and, since 1933, a member of the SS, Meyer became a powerful science organizer during National Socialism. He was director of the Institute for Agriculture and Agricultural Policy at Berlin University, member of the Prussian Academy of Science, and, in 1936, Vice President of the German Research Association to name but a few of his positions. Having an expertise in regional planning, Meyer became head of the Hauptabteilung "Planung und Boden" (i.e., central department for planning and soil) at the main office of the RFK (i.e., the Reich commissioner for the reinforcement of Germandom) where he led the work on the Generalplan Ost.[18]

The Forschungsdienst was subdivided into seven sections, so-called Reichsarbeitsgemeinschaften, each headed by an agricultural scientist. Appointed by Konrad Meyer, the section head was responsible for the planning and coordination of research activities in his respective field. Head of the crop science and plant breeding sectionwas Gießen University's George Sessous (1876–1962), who emphatically declared that German plant breeding was called to join the glorious fight for the nation's self-sufficiency in food.[19] The

actual research was handled by working-groups which usually comprised scientists from several universities and research institutes. For instance, the working group for fodder crop breeding was formed by researchers of the universities of Breslau, Danzig, Jena, and Munich, as well as the KWI for Breeding Research in Müncheberg.

The hierarchical structure of the Forschungsdienst seems to have allowed for an efficient coordination of research activities. The most important instrument for the governance of research however was the allocation of funds. Konrad Meyer, who had the ultimate power to decide about the assignment of funds, could draw upon money from various sources including the Ministry for Food and Agriculture, the Reichsnährstand, and the German Research Association. The latter was reorganized in 1937 and supplemented by the German Research Council.[20] Meyer became head of the agronomy and general biology section. The amalgamation of the Forschungsdienst and German Research Council organizations meant a tremendous increase in power for Meyer. This is reflected in the huge amounts of money he was able to distribute. Amounting to 31% of the council's overall funding budget in the period 1935–1943, the agronomy and general biology section had more money at its disposal than any other section of the council. In most years, the amount Meyer distributed even exceeded the amount of all other scientific and technical council sections taken together. Of course, these amounts do not only illustrate Meyer's powerful position within the German research system but also the strategic significance the National Socialist state attached to agricultural research.[21]

Although it is not possible to provide a detailed record of the money poured into the agricultural research system, evidence suggests that academic plant breeders could greatly benefit from funds provided by public and semi-public organizations—ranging from a diversity of ministries to the SS. As far as one can judge from the available sources, most applications for research grants had been successful,[22] and there was also a lot of money for the extension and support of research institutes. The main beneficiary of the financial windfall was undoubtedly the KWI for Breeding Research. In 1937–38, its budget exceeded the amount of RM 1 million and further increased to RM 2.1 million up until 1942–43. Staffed with 48 scientists, 95 technical assistants, and 300 semi-skilled laborers, the institute was by far Germany's biggest research institute for plant breeding in the early 1940s. Thanks to the massive funding, it established a series of branch institutes. Within the university system, in the early 1940s, the biggest institute for plant breeding was that of Theodor Roemer in Halle. Roemer employed twelve scientists, eight technical assistants, and 116 semi-skilled laborers.[23] Regarding its

institutional and financial basis, academic plant breeding was certainly on its way up during the Nazi era.

## Research for autarky

How did academic plant breeders translate Nazi policies of autarky into research projects?[24] To begin with, academic breeders generally shifted their focus to the development of crop varieties which could be put on the market. The National Socialist state promoted this shift in various ways. For instance, in 1939 a framework was established that regulated the cooperation between private and academic plant breeders.[25] While it was the duty of the private breeders to produce and distribute high-quality seed, academic breeders were to develop new crop varieties. Regarding the latter, the most urgent goal was—as George Sessous unfailingly emphasized—the "increase of yields" and "the closing of the protein, fat and fiber gap."[26] As a consequence, particular importance was given to plant varieties which were rich in these substances.

Sessous himself set a good example and initiated a research project on the soybean. This work was based on a collection of wild and cultivated varieties compiled in the 1920s by a botanist from the I.G. Farben. Due to the quality of its protein that can fully substitute for animal protein, the soybean was considered an ideal crop in the struggle for agricultural autarky. Yet, despite extensive efforts of many researchers and a generous support from state authorities, the soybean project proved largely a failure since it was not possible to adopt the plant to the conditions of cultivation in Germany.[27]

Other legumes than the soybean—for instance, alfalfa and seradella—were successfully developed into high-value fodder crops. Responsible for this line of work was a working group entitled "Breeding and Selection of Fodder Crops" that was coordinated by Friedrich Berkner (1874–1954) of Breslau University. As for oilseeds and fiber plants, academic breeders were mostly interested in rapeseed and closely related varieties, as well as in hemp and flax. The director of the Hamburg Institute for Applied Botanics Gustav Bredemann (1880–1960), for example, worked on a flax variety that was rich in both oil and fiber. He also tried to develop the stinging nettle into a first-class fiber plant. A curiosity of the time was the failed attempt by Max Koernicke (1874–1955) of Bonn University to breed olive trees for the cultivation under the climate conditions of Germany. In his grant application submitted to the German Research Association Koernicke successfully argued that one has to take every chance to overcome the domestic shortage in oils and fats.[28]

There are many more examples of exotic and not-so-exotic plants which academic breeders included into their research programs in order to meet the needs of agricultural self-sufficiency. In view of the striking interest in novel plants, it has to be emphasized that more traditional crops such as cereals and potatoes certainly remained important objects of academic breeding. There was, however, some change in breeding goals. For instance, the breeding of protein rich fodder barley was a sort of novelty in the Nazi era, since academic breeders traditionally tried to develop low protein barley for the brewing industry.

The great variety of oil, protein and fiber plants handled by agricultural scientists at universities and research institutes as well as the shift of breeding goals illustrate well the academic plant breeders' willingness to support and implement Nazi policies of autarky. Still, it would be mistaken to assume that academic plant breeders concentrated their efforts exclusively on the development of crop varieties. As a matter of fact, there was much basic research done at state funded institutes. Despite the general emphasis on yield maximization, breeding goals such as quality and resistance did not vanish. The realization of these goals however asked for basic research on subjects like plant-pest interaction. Furthermore, there was hope that new breeding methods such as species and genus crossings would help towards a more efficient development of new crop varieties, and here again basic research was a necessary prerequisite.

A rising field of basic research entered by academic plant breeders at the time was mutation research. It was generously supported by the German Research Association/German Research Council. About 17 percent of the money the organization spent for botanical work between 1934 and 1945 was poured into mutation research, and more than 80 percent of this amount was given after 1940.[29] Obviously, the National Socialist state considered mutation research important enough to be substantially promoted even during the war. The use of high energy radiation for breeding had been intensively studied at the KWI for Breeding Research and, since 1942, at the newly founded KWI for Research on Cultivated Plants in Vienna, Austria. At both institutions, it was Hans Stubbe (1902–1989), a pioneer in the use of high-energy radiation for breeding, who managed the work. Yet, it was Rudolf Freisleben (1906–1943) of Halle University who succeeded to demonstrate that high-energy radiation could indeed generate valuable mutations in crop plants. In 1941, Freisleben and his colleague Alfred Lein irradiated about 20,000 barley grains with X-rays, thereby achieving a mutant resistant to mildew.[30] The use of high-energy radiation has never become a standard method in plant breeding. Nevertheless, the work of Stubbe, Freisleben and other academic breeders

demonstrates that even during the war there was room for basic research on the genetics of plants and on breeding methods.

## Academic plant breeding and the expansion towards Eastern Europe

As aforementioned, colonial plant breeding lost a great deal of its scientific and political significance with the German defeat in World War I. But when Nazi expansionism became more and more tangible in the second half of the 1930s, academic plant breeders were keen to revive the discussion about colonialism.[31]

Theodor Roemer, who had already left for the African colonies in the mid-1910s "in order to bring German knowledge and character to bear under the tropical sun," once again turned his interests towards the former dependencies. In 1938, he argued that a German commitment in Africa could improve the domestic food situation, which—sure enough—was everything but problematic at the time.[32] Although Roemer's call for a return of former German colonies met the revisionist aims of National Socialist foreign policy, Hitler envisioned the country's new colonial empire in Eastern Europe rather than in Africa. Considering the quotation in the introduction of this article, the political instinct of Wilhelm Rudorf was certainly better developed than that of his colleague Roemer.

Nazi ideas on Lebensraum in Eastern Europe took shape in the Generalplan Ost commissioned by Heinrich Himmler (1900–1945) at the end of the 1930s. The principal author of the plan was Forschungsdienst chairman Konrad Meyer, who—as we have seen—also worked hard to direct agricultural research towards autarky. The Generalplan Ost aimed for the enslavement, deportation, and killing of Eastern Europe's native population that should be followed by a genetically improved German master race.[33] Since the economy of the envisioned Lebensraum should be based on agriculture, the Nazi regime considered agricultural sciences in general and plant breeding in particular as important instruments for the appropriation and transformation of Eastern Europe. This is evident from the establishment of several research institutes mainly, but not exclusively, operated under the umbrella of the Kaiser Wilhelm Society.[34]

A case in point is the German-Bulgarian Institute for Agricultural Research in Sofia that was the outcome of a 1940 agreement between the two countries to cooperate in the agricultural sciences. It had been initiated by Konrad Meyer and Dontscho Kostoff, director of Sofia's Central Agricultural Experiment and Research Institute. According to the 1941

foundation charter of the institute, Germany and Bulgaria were committed to equally share construction and support costs, as well as the management of the new institution. Kostoff should become "Bulgarian director" whereas the Kaiser Wilhelm Society—representing the German interests—favored Arnold Scheibe (1901–1989) as his German counterpart. Scheibe had just been appointed Professor for Agriculture and Crop Science at Munich Technical College. "In view of the great political, economic and scientific challenges which Germany will be facing in the future in the European southeastern territory," he nevertheless agreed to serve as temporary director during the establishment of the institute—though only in addition to his Munich professorship.[35]

At the laying of the foundation stone for the German-Bulgarian Institute in September 1942, the President of the Kaiser Wilhelm Society Albert Vögler (1877–1945) expressed his belief "that the results obtained here in the continental climate of the European Southeast will have a fundamental importance for the New Europe, too. That is because the main focus of pan-European agricultural production will be shifting to the territories of the European East and Southeast."[36] However, the establishment of the institute proceeded only slowly and stopped in September 1944 when Soviet troops marched into Bulgaria. At the beginning of that year, Scheibe, who considered the new institute a "focal point for German scientific work in the whole Balkans,"[37] had still received two grants from the German Research Council for the breeding of oil and fiber plants. Whether this work had actually been started is yet not known from the available sources.

Two further examples of institutions established in the context of Nazi expansionism are the KWI for Cultivated Plant Research in Vienna and the SS-Institute for Plant Genetics in Lannach near Graz. The scientific background of their establishment was the growing interest of academic plant breeders in wild-type forms of cultivated plants. Wild-types had been identified as carriers of valuable genes that could be transferred to cultivated relatives through cross breeding. In so doing, academic breeders hoped to improve crop traits like resistance to drought and frost. Since the mid-1920s, German academic breeders, such as Erwin Baur, had been making expeditions into the centers of origin of cultivated plants in order to look for and collect wild-types.[38]

Due to the growing interest of breeders in wild-type plants, in 1939, geneticist Fritz von Wettstein (1895–1945) argued for an institute for crop plant research to be established by the Kaiser Wilhelm Society. About the same time, members of Himmler's research and teaching community Das Ahnenerbe also developed the idea of founding an institute. Its objective

should be to analyze the wild-type plants compiled during the 1938 expedition of the SS to Tibet. For several reasons, the establishment of both institutes had been delayed for some time. With the German attack on the Soviet Union in June 1941 the situation changed, however. The German troops took possession of parts of the Vavilov institutes network and its large assortments of wild and cultivated plants. In order to "safeguard and exploit"[39] these assortments, the Kaiser Wilhelm Society and the SS decided to speed up the establishment of the institutes. While the two organizations initially agreed on a joint institution, the struggle over its leadership finally let to the foundation of two competing collection and research centers in 1943.

The KWI for Cultivated Plant Research was provisionally housed in the Vivarium, the former Austrian Biological Experiment Institute located in the Vienna Prater. Hans Stubbe of the Baur school became the director. The main goal of the institute was to build up a comprehensive collection of wild-type forms of the cultivated plants of Germany and to use the collection for research in genetics and plant breeding; the assortments from the Vavilov institutes should be integrated into the collection. In addition to this long term goal, Stubbe wanted to perform mutation experiments on barley, peas, and beans. Though he was able to start working, the proceeding war brought an abrupt end to the research activities—just like in the case of the German-Bulgarian Institute in Sofia.

The SS-Institute in Lannach was set up and directed by Heinz Brücher (1915–1991), who, in June 1943, joined a task force established by the SS to rob the assortments of wild and cultivated plants from the Vavilov institutes in the occupied territories.[40] Drawing upon these assortments as well as on those of the 1938 SS Tibet expedition, Brücher wanted to start "breeding cold and drought resistant crop plants for the Eastern territory,"[41] With great fervor he also pursued the breeding of a Chilean composite plant, whose oil was supposed to be used as a fuel additive for aircraft engines. Due to its robustness, the composite was envisaged for the "light low-yield soils of the continental climate of the East." Himmler, who showed great interest in the work of the newly established institute, reserved the right to personally give a name to the novel oil plant. Due to the destruction of the institute by the end of the war, the research and development work did not proceed beyond an early stage in Lannach.

## Kok-saghyz—the cooperation between Kaiser Wilhelm Society and SS[42]

How tightly coupled academic plant breeding and Nazi tyranny could be is well illustrated by a large project in which the Kaiser Wilhelm Society and Himmler's SS cooperated. The project was centered on the extraction of natural rubber from Kok-saghyz (Taraxacum bicorne)—a dandelion-like composite plant of the temperate zone. Pioneering Kok-saghyz cultivation, the Soviets had started to develop a large-scale process for the extraction of rubber from the plant roots in the 1930s.

For the German arms industry, rubber was of strategic importance due to its use in the production of military equipment, above all tires for jeeps and trucks. According to Hitler the growing demand for rubber should be met by Buna, the synthetic rubber of the I.G. Farben industry. Yet, in order to secure some material properties of the Buna rubber it was still necessary to add small amounts of natural rubber to its synthetic substitute, and thus German rubber production depended on imports of the natural product. In view of this dependence the Nazi regime welcomed the idea to produce natural rubber within its sphere of control. Kok-saghyz seemed to be an ideal plant for the task.

In order to produce natural rubber the Germans first had to get hold of the sought-after plant. Himmler, who claimed to have been pointed to Kok-saghyz in 1941 by Hitler himself, thus put the machinery of the SS Economic and Administrative Main Office in motion. After the attack on the Soviet Union, SS members were able to take possession of Kok-saghyz seeds which, in the spring of 1942, were planted at Rajsko, the agricultural station of the Auschwitz concentration camp. In charge of the field trials was agricultural scientist and station director Joachim Caesar (1901–1974), who had established the Rajsko facility at Himmler's disposition. To conduct breeding work on Kok-saghyz Caesar ordered the transfer of a group of appropriately skilled women from the Ravensbrück concentration camp to Auschwitz where they were put in a shack located on the Rajsko station's ground. As Caesar pointed out in an internal report this measure allowed for an easy control of the women prisoners because there was "always the possibility of a transfer to the much harsher conditions of the main camp."[43] When Auschwitz was evacuated at the beginning of 1945, the "commando group plant breeding" comprised 150 women prisoners as well as several German civilians, people from the SS, and Soviet scientists. Although the latter were not camp prisoners, they were also not allowed to leave the Auschwitz complex.

The breeding work done at the Rajsko station aimed at the increase of the rubber content of the Kok-saghyz plant. It was based on the method of mass selection. To speed up the

selection process, the "commando group" simultaneously handled several thousand plants, the rubber content of which was analyzed in the station's chemical-technical laboratory headed by Caesar's wife. In 1943, the number of tested plants already amounted to 88,000. In addition to the chemical testing of single plants, the "commando group" carried out population research in order to disclose the genetic basis of traits such as growth behavior and flower formation. A significant outcome of this work was the demonstration that rubber content is indeed a hereditary trait of Kok-saghyz. Yet, it is not possible to judge from the available documents whether the breeding work at the Rajsko station actually led to a plant with a significantly improved rubber content.

The agricultural station at the Auschwitz complex was not the only institution interested in the breeding of Kok-saghyz. Since the mid-1930s, scientists of the KWI for Breeding Research in Müncheberg had been searching for rubber plants that could be cultivated in the German climate. It took some time before the academic breeders came across the Kok-saghyz plant of which they were able to obtain a seed sample through the Agricultural Research Institute in Puławy, Poland, in 1938.[44] Wilhelm Rudorf entrusted his assistant Richard Werner Böhme (1903–1945) with the task of analyzing this sample. Although the original seed yielded quite a heterogeneous population of plants, Böhme succeeded to isolate a group of plants that raised hopes for a rubber yield of 200 to 300 kilogram per hectare. In 1941, field trails already covered an area of 4 hectares most of which were part of the "Rotes Luch," a country estate near Müncheberg that offered ideal conditions for the cultivation of Kok-saghyz. Most of the Kok-saghyz research done at the Müncheberg institute focused on the development of suitable breeding and selection techniques. For instance, in a series of experiments Kok-saghyz plants were treated with the mutagenic substance Colchicine to induce polyploidy in hope for plant varieties with increased rubber content. Likewise, inheritance studies should answer the question of whether leaf shape and root seize were correlated—a fact that would have allowed to simplify the procedure of mass selection. Additionally to their breeding research, the institute scientists worked on questions concerning the cultivation of Kok-saghyz (e.g., the question of the most suitable soil conditions).

Böhme pushed the work forward with the utmost diligence, using all means available. This included the use of forced labor and a tight cooperation with the agricultural station at the Auschwitz complex. Wilhelm Rudorf, director of Germany's largest institute for breeding research, supported all of Böhme's activities.

In June 1943, shortly after Himmler had been appointed special representative of plant rubber, a workshop was held in the SS Head Office in Berlin dealing with the breeding and cultivation of Kok-saghyz. Among the participants were numerous renowned agronomists such as the director of the Puławy Agricultural Research Institute Friedrich Christiansen-Weniger (1887–1889), the director of the Berlin Institute for Genetics Hans Kappert (1890–1976), and the head of the East Prussian branch of the KWI for Breeding Research Walther Hertsch (1901–1975). In order to better coordinate Kok-saghyz work Himmler ordered the formation of several working groups, each with a different focus. Wilhelm Rudorf, who introduced the prospected work program to the participants, and Werner Böhme got the responsibility for basic research while Joachim Caesar took over practical breeding work.

Considering the single-mindedness with which Himmler promoted the Kok-saghyz project, Rudorf and Böhme hoped for an increase in their research budget. Böhme developed the idea to turn the Rotes Luch estate into an institute for plant rubber. His plan included a chemical-technical laboratory, 50 to 100 hectares of land for cultivation and breeding, and a staff of about 90 people. As Böhme emphasized, the advantage of the country estate was that neighboring woods would not only protect the location from migrating weeds but also from an over-interested public.[45]

The Böhme plan did not find much approval. Rather than supporting the foundation of a new institute, the SS pushed for an expansion of the Auschwitz capacities. Rudorf, Böhme, and Caesar thus met with Hans Stahl, Himmler's Stabschef (i.e., captain) for plant rubber, in order to negotiate the transfer of basic research on Kok-saghyz from the Müncheberg institute to the Auschwitz concentration camp. From an organizational perspective, this meant the "merging of a division of the KWI for Breeding Research with the station in Auschwitz."[46] Rudorf consequently remained in charge of basic research, while on-site work should be coordinated by Böhme, who—after his appointment as SS-Sturmbannführer—took office in Auschwitz.[47]

When the Germans left Auschwitz in January 1945 because of the advancing Soviet troops, the women prisoners of the "commando group plant breeding" were transferred to the Ravensbrück concentration camp. The Rajsko breeding station moved to Büschdorf near Halle, where the Soviet scientists were also brought. At the end of the war, when the German scientists took flight, the American military government asked academic plant breeder Theodor Roemer of Halle University to carry on the Kogsaghyz work. Roemer, who was perfectly informed about the project, however refused "to take charge for 13 Russian scientists while 80 of my own

people have to be laid off." And he continued: "Moreover, I do not intend to burden myself with parts of the SS organization. In our region and in our time, the breeding of Kok-saghyz has no significance; we have to produce potatoes, breadstuff, sugar, and butter."[48]

Like Roemer many other academic breeders quickly tried to adapt their work to the postwar conditions which—regarding the shortage of foodstuff—did not seem to differ too much from the war time. Wilhelm Rudorf, who had moved his institute from Müncheberg towards Western Germany, declared in 1946: "Given the current lack of food and feedstuff the motto is: production, and only production!"[49] With a few exceptions, membership of the German academic plant breeding community did not change. As a mater of fact, most of the scientists remained in their academic positions of the wartime years.

## Conclusion

When studying the history of academic plant breeding during the era of National Socialism, one might be struck by the willingness of the majority of scientists to support and implement policies of autarky and Lebensraum. This willingness is well illustrated by the multitude of protein, oil and fiber plants on which academic breeders at universities and other research institutions worked, as well as by a series of new establishments pursuing an accordant agenda. German academic plant breeders were not only keen to fight for the nation's agricultural self-sufficiency; they also took part in the appropriation and transformation of the new Lebensraum in Eastern Europe. In fact, the available sources of that time did not reveal much doubt or critique among academic breeders. The known protest by botanist Elisabeth Schiemann (1881–1971) of the Baur school, who in 1936 complained to a former colleague about his involvement in the nazification of the KWI for Breeding Research, did not disprove this general conclusion.[50]

If we want to understand the reasons for the striking willingness of the German academic plant breeding community to work for the National Socialist state it is necessary to look at the early history of the discipline. As we have seen, autarky and expansionism, or colonialism respectively, have been on the political agenda of academic plant breeders long before the Nazis came into power. The continuity of the concept of agricultural self-sufficiency taken up by academic breeders by the eve of World War I is quite obvious. Erwin Baur's advocacy for autarky—both on a rhetorical and a practical level—is a telling example. In the public perception, the successful breeding of the sweet lupin did not only establish a tight link between modern plant breeding and the quest for autarky but also reduced the latter to a

technical problem to be solved with the tools of applied genetics. The link between the concepts of Lebensraum and colonialism is perhaps not as obvious since it is located on a more abstract level. However, both concepts share the idea of appropriating and transforming foreign territories by the means of agriculture, including the tools of plant breeding. Considering these historical continuities, the National Socialist state offered academic plant breeders a welcomed framework for the implementation of already formulated research programs. In this respect, the transition from the Weimar Republic to the "Third Reich" was certainly not as abrupt as one might think.

The same applies to the general role of the state for the promotion of plant breeding that I have only briefly addressed for the pre-Nazi era. The growing influence of state authorities on plant breeding can be traced back to the establishment of state-owned breeding institutes, the objective of which was to substitute for the lack of private initiatives in South Germany. Yet, also, where private initiatives were well developed at the turn of the century as in the Prussian province of Saxony and its adjoining regions, the federal and state governments had to compensate for a growing research load after World War I. This was due to the lack of a plant variety protection act and the financial crisis of the agricultural sector that troubled the breeding research of private seed firms in the 1920s. Since an increasing number of public and publicly financed research institutions took charge of the development of new breeding methods and new crop varieties, the main locus of innovation had shifted from the private to the state sector by the end of the Weimar Republic. The close cooperation between academic plant breeders and state authorities—the orientation of research towards public goals on the one hand and the promotion of academic plant breeding through the state on the other—was thus an established model of interaction when the Nazis assumed power in 1933.

Conceptualizing the science/politics relationship in terms of a mutual exchange of resources—as proposed by Ash—it becomes evident that the National Socialist state could draw upon established exchange patterns in academic plant breeding. Nevertheless, the Nazi era also brought some significant changes to the work done at universities and other research institutions. In general, emphasis shifted to practical breeding work—i.e., the development of crop varieties to be put on the market by the practical breeders. Moreover, new crop plants, in particular those rich in proteins, oils, and fibers, were included into the work of academic breeders. And last but not least, there were some new breeding goals such as the adoption of plants to the climatic conditions of Eastern Europe.

Considering the re-orientation of academic plant breeding, the Forschungsdienst has to be considered an efficient instrument of science policy. It is not possible to judge the contribution of academic research to the securing of foodstuff during World War II—which of course was also based on the plundering of occupied territories. The orientation of academic research towards policy goals and the effective coordination of work forces is undisputed, however. If we look in addition at the development of basic research as done in fields such as mutation genetics we are confronted with quite a complex picture of academic plant breeding in National Socialist Germany. It has certainly nothing to do with the kind of agrarian romanticism that is often associated with Nazi ideology.

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* Munich Center for the History of Science and Technology, c/o Deutsches Museum, 80306 München, Germany, thomas.wieland@lrz.tum.de.

[1] An earlier version of this article has been published as Thomas Wieland, "'Die politischen Aufgaben der deutschen Pflanzenzüchtung'. NS-Ideologie und die Forschungsarbeiten der akademischen Pflanzenzüchter," in Autarkie und Ostexpansion. Pflanzenzucht und Agrarforschung im Nationalsozialismus, ed. Susanne Heim (Göttingen: Wallstein, 2002), pp. 35–56. See also Thomas Wieland, "Wir beherrschen den pflanzlichen Organismus besser,...". Wissenschaftliche Pflanzenzüchtung in Deutschland, 1889–1945 (München: Deutsches Museum, 2004) for detailed references.

[2] Wilhelm Rudorf, Die politischen Aufgaben der deutschen Pflanzenzüchtung (Goslar: Blut-und-Boden-Verlag, 1937), pp. 4–5. All translations from German are mine.

[3] Herbert Backe, Um die Nahrungsfreiheit Europas. Weltwirtschaft und Großraum (Leipzig: Wilhelm Goldmann Verlag, 1942), p. 10.

[4] For the nazification of the KWI for Breeding Research see also Jonathan Harwood, Styles of Scientific Thought. The German Genetics Community, 1900–1933 (Chicago: University of Chicago Press, 1993), pp. 218–225.

[5] Mitchell G. Ash, "Wissenschaft und Politik als Ressourcen für einander," in Wissenschaften und Wissenschaftspolitik. Bestandsaufnahmen zu Formationen, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts, ed. Rüdiger vom Bruch and Brigitte Kaderas (Stuttgart: Franz Steiner Verlag, 2002), pp. 32–51. For an application of Ash's framework see also Sheila Faith Weiss, "Human Genetics and Politics as Mutually Beneficial Resources. The Case of the Kaiser Wilhelm Institute for Anthropology, Human Heredity and Eugenics During the Third Reich," Journal of the History of Biology, 2006, 39:41–88.

[6] For the early history of plant breeding, both practical and academic, in Germany see Wieland, Wissenschaftliche Pflanzenzüchtung, chap. 1; and Thomas Wieland, "Scientific Theory and Agricultural Practice. Plant Breeding in Germany from the Late 19th to the Early 20th Century," Journal of the History of Biology, 2006, 39:309–343. Scholarly interest in the history of plant breeding has significantly increased over the last years and so did the literature on the subject. For a general introduction see Noel Kingsbury, Hybrid. The History and Science of Plant Breeding (Chicago & London: University of Chicago Press, 2009).

[7] Cf. Jonathan Harwood, Technology's Dilemma. Agricultural Colleges between Science and Practice in Germany, 1860–1934 (Bern: Peter Lang, 2005).

[8] Ludwig Kühle, "Eröffnungsansprache," Beiträge zur Pflanzenzucht, 1914, 4:1–4, quote p. 4.

[9] Michael Flitner, Sammler, Räuber und Gelehrte. Die politischen Interessen an pflanzengenetischen Ressourcen 1895–1995 (Frankfurt/M.: Campus Verlag, 1995), pp. 24–36.

[10] Theodor Roemer, "Die Pflanzenzüchtung als Entwicklungsfaktor kolonialer Landwirtschaft," Beiträge zur Pflanzenzucht, 1914, 4:94–107; Theodor Roemer, "Bedeutung, Durchführung und Aufgaben der Baumwollzüchtung," Jahrbuch der Deutschen Landwirtschaftsgesellschaft, 1914, 29:395–407.

[11] Carl Fruwirth, "Aufgaben der Pflanzenzüchtung in den Kolonien," Jahrbuch der Deutschen Landwirtschaftsgesellschaft, 1914, 29:204–212, quote p. 204.

[12] Kurt von Rümker, Die Ernährung unseres Volkes aus eigener Produktion (Berlin: Parey, 1912).

[13] Theodor Remy, "Neue Ziele der Pflanzenzucht," Beiträge zur Pflanzenzucht, 1914, 4:5–17.

[14] Baur to Harnack, Dec. 21st, 1917; and Denkschrift über die Gründung eines Forschungsinstituts für Pflanzenzüchtung, Dec. 1917, in Archives of the Max Planck Society, Abt I, Rep 1A, no. 2589.

[15] Erwin Baur, "Nationalwirtschaftliche Aufgaben und Möglichkeiten der Pflanzenzüchtung," Archiv des Deutschen Landwirtschaftsrates, 1933, 51:24–37.

[16] For an elaboration of this point see Thomas Wieland, "Die Süßlupine. Natürlicher Organismus, technisches Artefakt oder politisches Manifest?," Technikgeschichte, 1999, 66:295–309.

[17] Martin Kutz, "Kriegserfahrung und Kriegsvorbereitung. Die agrarwirtschaftliche Vorbereitung des Zweiten Weltkrieges in Deutschland vor dem Hintergrund der Weltkrieg I-Erfahrung," Zeitschrift für Agrargeschichte und Agrarsoziologie, 1984, 32:59–82 and 135–164; see also Horst Gies, "Die nationalsozialistische Machtergreifung auf dem agrarpolitischen Sektor," Zeitschrift für Agrargeschichte und Agrarsoziologie, 1968, 16:210–232; Horst Gies, "Aufgaben und Probleme der nationalsozialistischen Ernährungswirtschaft," Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, 1979, 66:466–499; and especially Gustavo Corni and Horst Gies, Brot, Butter, Kanonen. Die Ernährungswirtschaft in Deutschland unter der Diktatur Hitlers (Berlin: Akademie Verlag, 1997).

[18] For Konrad Meyer and the Forschungsdienst see Willi Oberkrome, Ordnung und Autarkie. Die Geschichte der deutschen Landbauforschung, Agrarökonomie und ländlichen Sozialwissenschaften im Spiegel von Forschungsdienst und DFG (1920–1970) (Stuttgart: Franz Steiner Verlag, 2009); Volker Klemm, Agrarwissenschaften im "Dritten Reich". Aufstieg oder Sturz? (1933–1945) (Berlin: mimeo, 1994), pp. 46–53; and Irene Stoehr, "Von Max Sering zu Konrad Meyer – ein 'machtergeifender' Generationenwechsel in der Agrar- und Siedlungswissenschaft," in Autarkie und Ostexpansion, ed. Heim, pp. 57–90.

[19] See, for instance, George Sessous, "Die Aufgaben der Pflanzenzüchtung in der Erzeugungsschlacht," reprint from Deutsche Landwirtschaftliche Presse, 1937, in Bundesarchiv Berlin, R 3602/412.

[20] For the history of the German Research Council see Sören Flachowsky, Von der Notgemeinschaft zum Reichsforschungsrat. Wissenschaftspolitik im Kontext von Autarkie, Aufrüstung und Krieg (Stuttgart: Franz Steiner Verlag, 2008).

[21] Cf. Ute Deichmann, Biologen unter Hitler. Porträt einer Wissenschaft im NS-Staat (Frankfurt/M.: Fischer Taschenbuch Verlag, 1995), pp. 59–63; Oberkrome, Ordnung und Autarkie; Kurt Zierold, Forschungsförderung in drei Epochen (Wiesbaden: Steiner, 1968), figures pp. 233–234.

[22] See, for example, Reichsarbeitgemeinschafts-Referate in Bundesarchiv Berlin, R73/13128.

[23] A detailed overview of German agricultural research institutes and their staff gives Hanns Piegler, Deutsche Forschungsstätten im Dienste der Nahrungsfreiheit. Ein Handbuch (Neudamm: Neumann, 1940), for plant breeding see pp. 152–171.

[24] For an overview see Klemm, Agrarwissenschaften im "Dritten Reich," pp. 78–84; see also the special issues no. 8 and 16 of the journal Der Forschungsdienst: Forschung für Volk und Nahrungsfreiheit (Neudamm: Neumann, 1938 and 1942).

[25] Richtlinien über die Abgabe von Pflanzenzuchtmaterial, Aug. 5th, 1939, LwRMBL 1939, no. 33, p. 842; and reponse of the academic plant breeders in Bundesarchiv Berlin, R 4901/975.

[26] George Sessous, "Arbeiten und Aufgaben der Reichsarbeitsgemeinschaft 'Pflanzenbau und Pflanzenzüchtung,'" in Forschung für Volk und Nahrungsfreiheit (Neudamm: Neumann, 1938), pp. 181–184.

[27] For a book length study of Nazi interest in the soybean see Joachim Drews, Die 'Nazi-Bohne'. Anbau, Verwendung und Auswirkung der Sojabohne im Deutschen Reich und Südosteuropa (1933–1945) (Münster: LIT Verlag, 2004).

[28] Koernicke, grant proposal, Anzucht winterharter Oliven, March 19th, 1942; German Research Association to Koernicke, March 20th, 1942, in Bundesarchiv Koblenz R73/122279.

[29] Figures are taken from Deichmann, Biologen unter Hitler, p. 78.

[30] Cf. D. Mettin and W. D. Blüthner, "The Development of Cytogenetic Research at the Plant Breeding Institute Halle/Hohenthurm with Special Reference to Aneuploidy in Cereals," Euphytica, 1996, 89:125–141.

[31] For colonial sciences in the era of National Socialism see, for instance, Heinrich Becker, "Von der Nahrungssicherung zu Kolonialträumen. Die landwirtschaftlichen Institute im Dritten Reich," in Die Universität Göttingen unter dem Nationalsozialismus. Das verdrängte Kapitel ihrer 250jährigen Geschichte, ed. Heinrich Becker, Hans-Joachim Dahms and Cornelia Wegeler (München: Saur, 1987), pp. 410–436; and Karsten Linne, "Aufstieg und Fall der Kolonialwissenschaften im Nationalsozialismus," Berichte zur Wissenschaftsgeschichte, 2003, 26:275–284.

[32]Theodor Roemer, "Ueber die Möglichkeit der Verbesserung der Ernährungslage Deutschlands aus den unter Mandatsverwaltung stehenden deutschen Schutzgebieten," Kühn-Archiv, 1938, 50:103–138, quote p. 104.

[33] See Götz Aly and Susanne Heim, Vordenker der Vernichtung. Auschwitz und die deutschen Pläne für eine neue europäische Ordnung (Frankfurt/M.: Fischer Taschenbuch Verlag, 1993), in particular pp. 394–440; Isabel Heinemann and Patrick Wagner, eds., Wissenschaft – Planung – Vertreibung. Neuordnungskonzepte und Umsiedlungspolitik im 20. Jahrhundert (Stuttgart: Franz Steiner Verlag, 2006); and Mechthild Rössler and Sabine Schleiermacher, eds., Der "Generalplan Ost". Hauptlinien der nationalsozialistischen Planungs- und Vernichtungspolitik (Berlin: Akademie Verlag, 1993).

[34] Cf. also Susanne Heim, Kalorien, Kautschuk, Karrieren. Pflanzenzüchtung und landwirtschaftliche Forschung in Kaiser-Wilhelm-Instituten 1933 bis 1945 (Göttingen: Wallstein Verlag, 2003).

[35] Scheibe to REM, Oct. 30th, 1941, in Historic Archives of the TU München, Personalakte 1256 (Arnold Scheibe), p. 20.

[36] Vögler's talk, Sept. 12th, 1942, in Archives of the Max Planck Society, Abt I, Rep 1A, no. 2925.

[37] Scheibe to Telschow, Feb. 27th, 1943, ibid.

[38] See Flitner, Räuber, Sammler und Gelehrte.

[39] Wettstein to President of the Kaiser Wilhelm Society, Oct. 13th, 1941, in Archives of the Max Planck Society, Abt I, Rep 1A, no. 2963, quote p. 6.

[40] Cf. Uwe Hoßfeld and Carl-Gustaf Thornström, "'Rasches Zupacken'. Heinz Brücher und das botanische Sammelkommando der SS nach Rußland 1943," in Autarkie und Ostexpansion, ed. Heim, pp. 119–144; see also Daniel W. Gade, "Converging Ethnobiology and Ethnobiography. Cultivated Plants, Heinz Brücher, and Nazi Ideology," Journal of Ethnobiology, 2006, 26:82–106.

[41] Bericht über das SS-Sammelkommando 1943 zur Sicherstellung von Saatgut der geräumten russischen Gebiete von Leutnant Dr. Brücher, not dated, in Bundesarchiv Berlin, NS 19/2583, pp. 3–15.

[42] See also Heim, Kalorien, Kautschuk, Karrieren, pp. 125–198.

[43] Jahresbericht (1942/43) der Gruppe Züchtung, Jan. 22nd, 1944, in Bundesarchiv Berlin, NS 19/3919, pp. 16–69, quote p. 60. For the actual living conditions of the Rajsko prisoners see Anna Zieba, "Das Nebenlager Rajsko," Hefte von Auschwitz, 1966, 9:75–108.

[44] For the Agricultural Research Institute in Puławy cf. Stanisław Meducki, "Agrarwissenschaftliche Forschungen in Polen während der deutschen Okkupation. Die Landwirtschaftliche Forschungsanstalt des Generalgouvernements in Puławy," in Autarkie und Ostexpansion, ed. Heim, pp. 233–249.

[45] Vogel to Brandt, April 6th, 1943; Umgestaltung des Provinzialgutes Rotes Luch in eine reichseigene Anlage zwecks Ausbaues zu einer Versuchsanstalt für Kautschukpflanzen, Böhme, March 29th, 1943, in Bundsarchiv Berlin, NS 19/3920, pp. 100–109.

[46] Note, Rudorf, Stahl, Caesar, Böhme, Feb. 18th, 1944, in Bundesarchiv Berlin, NS 19/3919, pp. 91–93.

[47] Zieba, "Das Nebenlager Rajsko," p. 87.

[48] Roemer to university trustee, June 1st, 1945; Roemer to head of district authority, Saalkreis, May 17th, 1945 in University Archives Halle, Rep 6/2757.

[49] Wilhelm Rudorf, Wie kann die Pflanzenzüchtung helfen? (Hannover: Landbuch Verlag, not dated), p. 3.

[50] Cf. Elvira Scheich, "Elisabeth Schiemann (1881–1972). Patriotin im Zwiespalt," in Autarkie und Ostexpansion, ed. Heim, pp. 250–279.