

ISBN: 978-602-74798-8-3

# PROCEEDING



**1<sup>st</sup> ICMHS**

1<sup>st</sup> International Conference  
on Medicine and Health Sciences

## Interprofessional Collaboration to Achieve Sustainable Development Goals (SDGs)

Aug 31<sup>st</sup>-Sep 1<sup>st</sup>, 2016  
Aston Hotel, Jember, East Java  
**Indonesia**



Hosted by:  
Faculty of Pharmacy | Faculty of Dentistry |  
Faculty of Medicine |  
Faculty of Public Health | School of Nursing  
**University of Jember, Indonesia**



*Membangun Generasi  
Menuju Insan Berprestasi*

## Message from the editors

Providing high standard health care to our society is challenging, especially when issues on equity versus equality in accessing health care is to be addressed. The 1<sup>st</sup> International Conference on Medicine and Health Sciences (**1<sup>st</sup>ICMHS**) on 31 August-1 September 2016 in University of Jember (UNEJ) Indonesia was held to not only disseminate the research update in health sciences but also to provide chances among the researchers and practitioners in health sciences to interact and share their experiences.

The **1<sup>st</sup>ICMHS** presented 9 keynote speakers, 7 invited speakers, attracted 45 oral presenters and 60 posters. The proceeding recorded valuable manuscripts which hopefully can be used as a media to transfer the knowledge to wider readers. Utmost thanks go to the scientific committee members who have provided enormous efforts from receiving, selecting and reviewing manuscripts. Special thanks go to the secretariat, publication, sponsorship, event and logistic divisions for giving support for the smooth run of the **1<sup>st</sup>ICMHS**. Final thanks go to the steering and organizing committees for assuring the **1<sup>st</sup>ICMHS** to achieve its aims. Congratulation delivered to the authors whose research finding in pharmacy, medicine, dentistry, nursing, public health, and other health sciences have indicated their novel and robust contribution to the development of health sciences.

Jember, November 2016

Ari Satia Nugraha  
On behalf of the editors  
1<sup>st</sup> ICHMS

## EDITORS

Ari Satia Nugraha, SF., GDipSc., MSc-res, Ph.D., Apt.

Lusia Oktora RKS, S.F., M.Sc., Apt.

Ika Puspita Dewi, S.Farm., M.Biomed., Apt.

Afifah Machclaurin, S.Farm., M.Sc., Apt.

Antonius Nugraha Widhi. Pratama, S.Farm., MPH., Apt.

# CONFERENCE COMMITTEE

## **Steering Committee**

Drs. Moh. Hasan., Ph.D (Rector of University of Jember)  
Drs. Zulfikar, Ph.D (Vice Rector for Academic Affairs University of Jember)  
Prof Drs Bambang Kuswandi, M.Sc., PhD  
drg. Rahardyan Parnaaji, M.Kes., Sp.Prof.  
dr. Enny Suswati, M.Kes.  
Irma Prasetyowati, SKM., M.Kes.  
Ns. Lantin Sulistyorini, S.Kep.,M.Kep.

## **Organizing Committee**

### **Chairman**

Lestyo Wulandari, S.Si., M.Farm., Apt.

### **Secretary**

Endah Puspitasari, S.Farm., M.Sc., Apt.

### **Treasurer**

Yuni Retnaningtyas, S.Si., M.Si., Apt.  
Nia Kristiningrum, M.Farm., Apt.

## **Secretariat, Publication, and Sponsorship Division**

Eka Deddy Irawan, S.Si., M.Sc., Apt.  
dr. Cich Komariah Sp.M.  
Anita Dewi Moelyaningrum, S.KM., M.Kes.  
drg. Ayu Mas Hartini, Sp.PM.  
Ns. Emi Wuri W., M.Kep., Sp.KepJ.

## **Event Division**

Diana Holiday, S.F., M.Farm., Apt.  
DR. drg. I Dewa Ayu Susilowati, M.Kes.  
dr. Hairrudin, M.Kes.  
DR. Farida Wahyuningtyas, SKM., M.Kes.  
Ns. Wantiya, S.Kep., M.Kep.  
dr. Ancah Caesarina Novi M., Ph.D.

## **Scientific Division (Editors)**

Ari Satia Nugraha, SF., GDipSc., MSc-res, Ph.D., Apt.  
Lusia Oktora RKS, S.F., M.Sc., Apt.  
Ika Puspita Dewi, S.Farm., M.Biomed., Apt.  
Afifah Machclaurin, S.Farm., M.Sc., Apt.  
Antonius Nugraha Widhi. Pratama, S.Farm., MPH., Apt.  
Dr. drg. Masniari Novita, M.Kes.  
dr. Rini Riyanti, Sp.PK.  
Yunus Ariyanto, S.KM., M.Kes  
Ns. Achmad Rifa'i, M.S.

## **Logistic Division**

Dwi Nurahmanto, S.Farm., M.Sc., Apt.

# CONTENT

PREFACE .....	i
EDITORS.....	ii
CONFERENCE COMMITTEE .....	iii
CONTENT.....	iv
PHARMACY.....	1
COMMUNITY PHARMACISTS' COUNSELLING SKILLS ON OVER-THE-COUNTER (OTC) MEDICATIONS .....	2
FORMULATION AND OPTIMIZATION OF CAFFEINE NANOEMULSION USING FACTORIAL DESIGN STUDY.....	6
EFFECT OF COMBINATION SODIUM ALGINATE-GELATIN 1% : 2% CONTENT IN CHARACTERISTIC AND ANTIMICROBIAL ACTIVITY OF PROBIOTIC MICROSPHERES <i>Lactobacillus acidophilus</i> .....	10
ANTIDIABETIC ACTIVITY OF POWDER AND ETHANOLIC EXTRACT OF ANTLION ( <i>Myrmeleon</i> sp.) ON WISTAR STRAIN WHITE MALE RATS WITH GLUCOSE PRELOAD .....	14
ANTIBACTERIAL AND ANTIBIOFILM POTENTIAL OF ETHANOLIC EXTRACT FROM BINTARO FLOWER ( <i>Cerbera odollam</i> ) AGAINST <i>Staphylococcus aureus</i> ATCC 6538.....	17
STRUCTURE MODIFICATION AND MOLECULAR MODELING OF 1-(BENZOYLOXY)UREA DERIVATIVES AS ANTICANCER DRUG CANDIDATES.....	20
CHARACTERIZATION AND THE RELEASE TEST OF ANTI-AGING TRETINOIN IN NANOEMULSION USING OLIVE OIL .....	23
EFFECT OF PARTICLE SIZE AND SURFACE CHARGE ON THE UPTAKE AND IMMUNE RESPONSE OF OVALBUMIN-ALGINATE MICROSPHERES .....	27
ANTIHYPERCHOLESTEROLEMIC EFFECT OF <i>Arcangelisia flava</i> STEM EXTRACT IN HYPERLIPIDEMIC RATS.....	31
GREEN TEA EXTRACT EFFECT ON BLOOD GLUCOSE LEVEL AND LIVER HISTOPATHOLOGY IN DIABETIC MICE .....	35
THREE-WAVELENGTH SPECTROPHOTOMETRIC METHOD VALIDATION FOR DETERMINATION OF PREDNISONE TABLET CONTAINING COLORING DYES .....	39
INFLUENCE OF OLEIC ACID ON THE IN VITRO PENETRATION OF DICLOFENAC SODIUM GEL	43
ANTIOXIDANT ACTIVITY OF METHANOL EXTRACTS FROM THE STEM BARK OF MANGROVE PLANT <i>Rhizophora mucronata</i> .....	47
PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY of MANGROVE PLANT <i>Sonneratia</i> sp. ....	51
EFFECT OF SOLID LIPID NANOPARTICLE (SLN) AND NANO STRUCTURE LIPID CARRIER (NLC) SYSTEM ON ANTIOXIDANT STABILITY OF TOMATO EXTRACT (LIPID: CETYL ALCOHOL AND ISOPROPYL MYRISTATE).....	55
EFFECTIVENESS OF BINTARO ( <i>Cerbera odollam</i> Gaertn.) LEAF ETHANOLIC EXTRACT AGAINST <i>Staphylococcus aureus</i> IN-VITRO BIOFILM FORMATION .....	59

STUDY OF ANTIOXIDANT ACTIVITY COMBINATION OF ARABICA COFFEE LEAF ETHANOL EXTRACT AND ROSELLE FLOWER PETAL WATER EXTRACT.....	62
INHIBITORY EFFECT OF NON-POLAR AND SEMI-POLAR FRACTIONS OF ETHANOLIC EXTRACT OF <i>Guazuma ulmifolia</i> Lamk. LEAVES ON RAT PREADIPOCYTES PROLIFERATION AND DIFFERENTIATION.....	66
THE INFLUENCE OF PHARMACEUTICAL CARE SERVICES MODEL IN PRESCRIPTION DRUGS ON PHARMACIST'S BEHAVIOR IN PHARMACEUTICAL CARE .....	70
COCRYSTAL OF ATORVASTATIN CALCIUM – MALONIC ACID .....	75
IN SILICO STUDY OF ACRYLAMIDE TOXICITIES USING TOXTREE METHOD AND ITS ANALYSIS IN POTATO CHIPS USING HPLC METHOD.....	79
IMPACT OF CISPLATIN BASE CHEMOTERAPY ON QUALITY OF LIFE IN INDONESIAN PATIENTS WITH CERVICAL CANCER .....	81
<i>Arcangelisia flava</i> LEAVES ETHANOLIC EXTRACT SUPPRESSES CANCER CELL LINES VIA NON APOPTOTIC PATHWAY.....	83
BANANA AND PLANTAIN AS MEDICINAL FOOD .....	87
FORMULATION AND OPTIMIZATION OF CARBOPOL AND ETHYL CELLULOSE AS FLOATING-MUCOADHESIVE SYSTEM OF DILTIAZEM HYDROCHLORIDE TABLET BY FACTORIAL DESIGN ..	92
DETERMINATION OF TOTAL PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY IN METHANOLIC EXTRACT OF ROBUSTA AND ARABICA COFFEE LEAVES.....	96
MICROBIAL ASSAY OF CYPROFLOXACIN IN A BONE IMPLANT (CHITOSAN –BOVINE HYDROXYAPATITE WITH CROSS-LINKER GLUTARALDEHYDE) TOWARDS <i>Staphilococcus aureus</i> ATCC25923 .....	100
IN VITRO $\alpha$ -GLUCOSIDASE INHIBITORY ACTIVITY OF VARIOUS TEA ( <i>Camellia sinensis</i> L.) EXTRACTS.....	104
B-CELL EPITOPE PREDICTION of <i>Mycobacterium tuberculosis</i> Ag85A ANTIGEN .....	108
EFFECT OF ETHANOLIC EXTRACT OF <i>Annona muricata</i> L SEEDS POWDER TO DECREASE BLOOD GLUCOSE LEVEL OF WISTAR MALE RATS WITH GLUCOSE PRELOAD.....	112
PROTEIN DENSITY AND QUALITY OF KORO KRATOK ( <i>Phaseolus lunatus</i> L. Sweet ) AND KACANG TUNGGAK ( <i>Vigna unguiculata</i> (L.) Walp) .....	116
HYPERTENSION MANAGEMENT APPROACH THROUGH MODIFIABLE RISK FACTORS IN JEMBER REGION COMMUNITY HEALTH CENTER .....	121
ASSOCIATION BETWEEN AEROALLERGEN SENSITIZATION AND THE SEVERITY OF ASTHMA IN PEDIATRIC PATIENTS.....	126
ANALYSIS OF FACTORS THAT RELATED MATERNAL SEVERE PREECLAMPSIA TO THE ASPHYXIA OF NEW BORN BABY IN SOEBANDI HOSPITAL JEMBER REGENCY .....	130
AN ANALYSIS OF THE ASPECTS OF HEALTHCARE SERVICE QUALITY IN RELATION TO PATIENT LOYALTY .....	133
SYNERGISTIC COMBINATION OF <i>Curcuma xanthorrhiza</i> , <i>Ficus septica</i> AND DOXORUBICIN INHIBITS METASTASIS OF BREAST CANCER THROUGH INHIBITION MMP-9 ACTIVITY .....	137
ASSOCIATION BETWEEN IGE SERUM LEVEL AND SEVERITY OF ASTHMA IN CHILDREN .....	142

CORRELATION OF CD4 WITH TOTAL LYMPHOCYTE COUNTS IN HIV PATIENTS.....	145
DENTISTRY.....	148
Determinants of HIV/AIDS Awareness and Knowledge in Tanah Papua, Indonesia .....	149
THE ABILITY OF ANTI-INFLAMMATORY JATROPHA CURCAS LEAF EXTRACT AT COX-2 EXPRESSION ON MONOCYTES WERE EXPOSED LPS .....	154
NOVEL METHOD THYROID HORMONE MEASUREMENT .....	158
ROBUSTA COFFEE BEANS INCREASE LEVELS OF TNF- $\alpha$ AS A RESPONSE TO <i>Streptococcus</i> <i>mutans</i> .....	162
THE LEVELS OF TNF-A IN GINGIVAL CREVICULAR FLUID (GCF) OF OSING TRIBE WOMEN WITH OCCLUSAL DISHARMONY.....	165
Effects of Robusta Coffee Bean Extract ( <i>Coffea robusta</i> ) on the Viability of Neutrophils Exposed by <i>Porphyromonas gingivalis</i> .....	169
ROBUSTA COFFEE BEANS DECREASE OF INFLAMMATION IN DENTAL CARIES.....	173
The Progressive Low Chronic Inflammation on Oral Tissues In Elderly.....	177
DENTAL CARIES IN PREGNANT WOMEN WHO VISITED POSYANDU OF SEVERAL PUBLIC HEALTH CENTERS IN JEMBER.....	182
Role of Chemoattractant Chemokine (SDF-1/CXCR4) In Bone Marrow Niche.....	185
Establishment of a Rat Model of Temporomandibular Joint Osteoarthritis using Intraarticular Injection of Complete Freund's Adjuvant .....	190
PUBLIC HEALTH .....	194
RECIPROCAL DETERMINISM "DAKOCAN" CHALLENGE EFFORTS TO REDUCE HIV AND AIDS CASES IN JEMBER DISTRICT.....	195
IRON TABLETS DISTRIBUTION OF PREGNANT WOMAN IN THE DISTRICT AND CITY OF EAST JAVA PROVINCE.....	200
RISK MANAGEMENT OF DUE TO EXPOSURE TO PESTICIDE POISONING FOR TOBACCO FARMERS IN THE JEMBER DISTRICT.....	204
AN OVERVIEW OF MOTHER KNOWLEDGE AFTER GIVING BIRTH ABOUT EXCLUSIVE BREASTFEEDING.....	208
DISASTER PREPAREDNESS AT PUBLIC HEALTH CENTER (PHC) BY SCORING ANALYSIS OF GENERAL ASPECTS, HEALTH CARE, SURVEILLANCE, ENVIRONMENTAL SANITATION AND LOGISTICS.....	212
INDEPENDENT FAMILY PLANNING IN RURAL AND URBAN AREAS GRESIK DISTRICT .....	215
UNMET NEED FOR FAMILY PLANNING ON ELIGIBLE COUPLE IN INDONESIA: 2007 IDHS DATA ANALYSIS .....	219
Shells That Have been Polluted by lead around Youtefa Bay in Jayapura City That Have Potential Risk Of Non Carcinogenic .....	223
DESIGN AND IMPLEMENTATION DIARRHEAL SURVEILANCE REPORT INFORMATION SYSTEM WITH WATERFALL METHOD IN HEALTH DEVELOPMENT OF JEMBER .....	227

LOCAL WISDOM OF JEMBER COMMUNITY IN REDUCING CYANOGENIC LEVELS TO LOWER URINE THIOCYANATE LEVELS .....	229
UNDERWEIGHT AND MORBIDITY STATUS AMONG UNDER FIVE YEARS CHILDREN IN SURABAYA.....	234
CONDOM USE AMONG EXIT CLIENTS OF FEMALE SEXUAL WORKERS FOR PREVENTION HIV/AIDS IN MAKASSAR.....	237
THE SOCIAL SUPPORT AND PREVALENCE EMESIS GRAVIDARIUM ON PREGNANT MOTHER IN TRIMESTER I AT PUSKESMAS KEMBARAN I BANYUMAS REGENCY.....	241
NURSING.....	245
We need a bigger bomb: a community attempt on fighting dengue fever in a suburban Surabaya, Indonesia .....	246
APPLICATION OF STANDART NURSING LANGUAGE (NANDA, NOC. NIC) USING SOCIAL MEDIA: INSTAGRAM® TO INCREASE INFORMATION SEEKING BEHAVIOUR AND MOTIVATION OF NURSING STUDENT.....	250
THE EFFECT OF ONION ( <i>Allium ascalonicum</i> L.) COMPRES TOWARD BODY TEMPERATURE OF CHILDREN WITH HIPERTERMIA IN BOUGENVILLE ROOM DR. HARYOTO LUMAJANG HOSPITAL .....	253
ACHIEVEMENT OF BLOOD PRESSURE TARGET WITH MEDICATION ADHERENCE AND SODIUM CONSUMPTION IN SAIFUL ANWAR GENERAL HOSPITAL OUTPATIENT CLINIC.....	257
EFFECT OF INSTRUCTIONAL VIDEO OF SPLINTING PROCEDURE TO NURSING STUDENTS SPLINTING SKILL (PREHOSPITAL SETTING).....	261
THE CORRELATION BETWEEN NURSE PERFORMANCE & THE LEVEL OF JAMKESMAS PATIENT SATISFACTION IN DAHLIA II WARD, NGUDI WALUYO WLINGI HOSPITAL .....	266
How To Maintain High Quality Cardiopulmonary Resuscitation In Adults : Literature Review .....	270
SMOKING BEHAVIOUR AMONG MIDDLE AND LATE ADOLESCENTS IN A SUB DISTRICT OF MALANG DISTRICT, EAST JAVA, INDONESIA.....	275
THE DIFFERENCES DECLINE BREAST ENGORGEMENT CONDUCTED CONVENTIONAL METHODS (BREAST MASSAGE) WITH HERB YEAST-KATU.....	282



# PROTEIN DENSITY AND QUALITY OF KORO KRATOK (*Phaseolus lunatus* L. Sweet ) AND KACANG TUNGGAK (*Vigna unguiculata* (L.) Walp)

Tejasari, Faculty of Agriculture Product Technology, Jalan Kalimantan No.37 Jember  
West Java Indonesia, Email: tejasari.unej@gmail.com

## INTRODUCTION

Proteins are macronutrient, plays important roles in human health. It is essential to life because it is a vital part of the nucleus and protoplasm of every cell. The outer layers of skin, the hair, and the nails consist of almost entirely of an insoluble protein called keratin. The most active and abundant tissues of the body – the muscles and glandular organs- are high in protein content. Lean muscles, heart, and liver contain 17-21 percent protein. Connective tissues consists mainly of protein. Blood carries the important iron-containing protein hemoglobin in red blood cells. Therefore, the 50 gram daily requirement is a must to be fulfilled.

Proteins are larger and more complex molecules than those of either fats or carbohydrate. The large molecules of protein made up of great number of amino acids. The number of different amino acids in the molecules of certain protein varies from 8 to 18 according to the size and complexity of the molecules of different protein. The number and composition of essential amino acids of protein determine utility of the protein for human health.

Humans obtain proteins from animal and plant food sources. Nuts food group is plant origin of food protein since it contains high protein, range from 17-30 percent. Koro kratok (*Phaseolus lunatus* L. Sweet) and kacang tunggak (*Vigna unguiculata* (L.) Walp) (Kasno and Achmad, 1988) are kinds of nut that have high protein content. However, its high amount of protein does not explain utilizing of the nut protein for human health. Intake of 50 gram protein does not explain the quality of protein. Therefore, it is important to evaluate the quality of nut protein.

## METHODS

This pure experimental research consists of four steps: 1) sample preparation- koro kratok dan kacang tunggak were clean from dirt, 2) grinding the bean became nut powder, 3) protein content analysis, and 4) evaluation of protein density and protein quality of the bean protein.

## Protein Content Analysis

Protein content was analyzed using Kjeldahl method (AOAC,2001; Walker, 2007). One gram nut powder was poured into the Kjeldahl flask, and then add 7 g of  $K_2SO_4$ , 0,8 g of  $CuSO_4$ , and 12 mL of  $H_2SO_4$ . The solution in the flask was heated in the smoked cupboard for 1 hour, and then was cooling off for 10-20 minutes. After cold, addition of water until 80 mL. Furthermore, the solution was added by 50 mL NaOH 40% w/w, then was distilled to get 150 mL. The distillate was poured to Erlenmeyer with 30 mL  $H_3BO_3$  1% w/v that given mix indicator. The distillate was titrated by standard solution – HCl 0.1 M until the clear violet color emerge.

## Protein Quality Evaluation (Tejasari,2005)

Protein quality was evaluated based on the Amino Acid Score (AAS) parameter using FAO/WHO amino acid pattern reference. There are eight essential amino acids (EAA)– isoleucine (Ile), lysine (Lys), methionine (Met) + cystine (Cys), Phenylalanine (Phe) + Tyrosine (Tyr), tryptophan (Tryp), threonine (Tre), and valine (Val). All these EAAs should be available in certain amount in order that protein be functioned, as stated by FAO/WHO. The EAAs pattern of FAO/WHO reference was used for comparing of the EAAs of the nuts. The Amino Acid Score (AAS) is percentage ratio between the nuts EAAs and the reference EAAs. This parameter explains the biological value of protein that determining of protein quality.

## RESULT AND DISCUSSIONS

Koro kratok and kacang tunggak (see Figure 1) are two kinds of nuts that increasingly used as food protein ingredient (Haliza dkk., 2007) because of its high protein content. However, it is important to know the quality of the protein in order to make sure its effect on health.

The principle use of protein in the body are as follows : 1) for building new tissues, 2) for upkeep of tissues, 3) as regulatory substances for internal waste and acid balanced, 4) as a precursor for enzyme, antibodies, some hormones, and one of the vitamin B, 5) for milk formation, and 6) for energy. As the vital function of protein, an appropriate intake level and balance of EAA and nonessential

amino acids of protein is required to support and maintain the adequate functioning cells and organs. The protein content is essential to maintain nitrogen balance in human body. Negative nitrogen balance is inevitably occurs when the protein intake is reduced below the minimum required for maintenance of body tissue or the minimum protein requirement. Meanwhile, the protein quality that can be indicated by score of amino acid explain the completeness of the number and kinds of essential amino acids needed for health. Certain number, quantity, kinds, and sequence of amino acids is needed in order to protein to be function.



Figure 1: Koro Kratok, Kacang Tunggak and its powder

#### Protein Density

Protein density is refer to the percentage of food protein content toward the protein recommended daily allowances (RDA). Koro kratok and kacang tunggak contributes by 35.6 and 39.8 percent of RDA, respectively. These figure showed that this nut have quiet high protein content.

Although, the protein is high in amount, however it does not tell about number, kinds, or amount of amino acids. Whereas, amino acids are needed for certain biological function of protein, such as lysine, tryptophan, methionine, and cystine are needed for growth and maintenance. Zein is low in lysine and tryptophan, gliadin low in lysine. Therefore, these protein play in maintenance roles, not for growth. The density of these two nuts are lower than the protein density of green and kidney bean (see Figure 2).

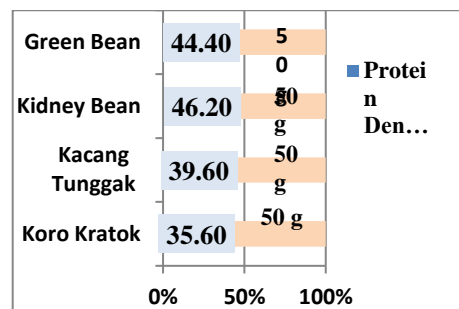


Figure 2: Protein density of Koro Kratok and Kacang Tunggak beans compare to other bean

#### Protein Quality

Protein quality could be evaluated using Amino Acids Score (AAS) parameter. The value of AAS indicated the fulfillment level of every EAAs toward the amount of every EAA standard. The highest the score, the best of the protein quality. Amino acid with the lowest value of the AAS limits the protein function.

The evaluation showed that Koro Kratok very good in Phenilalanine and tyrosine, and treonine, indicating by its AAS values; 130 and 100 (above and 100), good in tryptophan and valine, and quiet good in iso leucine, leucine, and lysine, and not good in methionine and cystine.

The essential amino acids data evaluation (see Table 1) showed that Koro Kratok very good in Phenilalanine and tyrosine, and treonine, indicating by its AAS 130 and 100 (above and 100), good in tryptophan and valine, and quiet good in iso leucine, leucine, and lysine, but not good in methionine and cystine.

The essential amino acids data evaluation (see Table 1) showed that Kacang Tunggak is good in lysine, phenylalanine and tyrosine, and tryptophan, indicating by its AAS values above 100. This bean has protein quality quiet good in leucine, isoleucine, and valine, however low in methionine and cystine.

Protein analysis showed that the both beans, Koro Kratok and Kacang Tunggak, have high protein content. However, amino acids data analysis showed that in a whole, the protein quality of both nuts are low, indicating by its AAS values as follows: 23 and 45, respectively, with the same limiting amino acids of the protein of the bean is methionine and cystine. It means that these two bean is not food sources of methionine and cystine. Therefore, as food ingredient, it is important to add other kinds of nut that high in methionine and cystine to increase the quality of the protein.

Methionine, the essential sulfur amino acids, has sparing effect of dietary cystine. The estimates of the methionine-sparing effects of dietary cystine in human vary widely, from about 16-89% of the total methionine requirements, relative to the methionine need determined with a cystine-free diet (Bowdell and Erdman, 1988).

**Table 1. Evaluation of nuts protein quality indicating by Amino Acid Score (AAS)**

Bean or Nuts	Protein Content	Essential Amino Acid Content per 100 g bdd								SAA value (counting)
		Ile	Leu	Lis	Met + Cys	Phe+Tyr	Treo	Trypt	Val	
Koro Kratok	12,5 g	314	554	395	101	979	500	100	500	SAA =23 Amino acid Restrictian  Methionine-Cystine (m-s)
	17,8 g	447	789	562	143	1394	712	142	712	
	1 g	Essential Amino Acid Content per g protein								
	SAA	62,5	62,85	58,18	22,86	130	100	80	80	
Kacang Tunggak	24,4 g	764	1466	1455	383	1840	831	302	815	SAA = 45 Amino acid Restrictian  Methionine-Cystine (m-s)
	19,88 g	622	1194	1186	312	1499	677	246	664	
	1 g	Essential Amino Acid Content per g protein								
	SAA	78,25	85,7	108,5	44,86	125,7	85,25	124	66,8	
Amino Acid Pattern	(mg EAA/g Protein)	40	70	55	35	60	40	10	50	
FAO/WHO										

### CONCLUSION

The protein content of Koro Kratok and Kacang Tunggak are quiet high, that is 17.8 and 19.8 g per 100 gram of its edible portion.

The protein density of the protein are low, that is 35.6 and 39.8 percent of RDA, respectively.

The quality of protein of Koro Kratok and Kacang Tunggak is low, indicating by its low value of Amino Acid Score (AAS) that is 23 and 45, respectively.

The limiting amino acids is methionine + cystine because it limits the function of the protein it composed.

### REFERENCES

1. Boldwell, C.E. and Erdman, J.W. Nutrient Interaction. Marcel Dekker. New York. (1988).

2. Direktorat Gizi Depkes RI. *Daftar Komposisi Bahan Makanan*. Jakarta: Bhratara Karya Akasara (1995).

3. Duranti, M. Grain legume proteins and nutraceutical properties. *Fitoterapia*. 77 : 67-82. (2006).

4. Haliza, W., Endang, Y. P., dan Ridwan, T. Pemanfaatan Kacang-Kacangan Lokal sebagai Substitusi Bahan Baku Tempe dan Tahu. *Buletin Teknologi Pascapanen Pertanian Vol. 3 (2007)*.

5. Kasno, A. dan Achmad, W. Kacang Tunggak. *Monograf Balitbang*. No. 3-. ISSN 0854-8617. (1998)

6. Mollina Ortiz, S.E. dan Wagner, J.R. Hydrolysates of native and modified soy protein isolates: structural characteristics, solubility and foaming

- properties. *J. Food Research*. 35 (6) :511-518. (2008)
7. Tejasari. 2005. Nilai Gizi Pangan. Penerbit Graha Ilmu. Yogyakarta.
  8. Walker, J. M. The Protocol Protein. (Handbook). (Edisi Kedua). New Jersey: Human Press. (2010).
  9. Maqueda, L., Miralles, A., and Ruiz. Extraction /Fractination Techniques for Protein and Peptides and Protein Digestion. *Food Microbiology and Food Safety*. DOI 10.1007/1978-1-4614-5626-1\_2. (2013).
  10. Vierness, Gracia, Torio, dan Angelia. Antihypertensive peptides from vicillin, the major storage protein of mung bean (*Vigna radiata* (L.) R. Wilczek). *Journal of Biological Sciences*. 12 (7) : 393 – 399. (2012).